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Full Length Research Paper

Economic profitability of guinea sorrel production in the District of Korhogo

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Guinea sorrel (*hibiscus sabdarifa*) of the malvaceae family is a plant produced locally in the District of Korhogo and mainly in Natiokobadara. Produced for its leaves, it is used in food. This study analyses the economic profitability of guinea sorrel cultivation in the District of Korhogo. It concerned the 25 women producers who make up the Katana group of Natiokobadara. The methodology used in this work incorporates a questionnaire survey to collect both quantitative and qualitative information. Then, an operating account was used to organize information on expenses and income and to estimate profitability indicators. From the results, it can be noted that women are the most active in the production of guinea sorrel. The seed supply method is either cash (64%) or credit (36%). The total turnover achieved by the group amounts to 3, 063,150 CFA Francs. The expenses borne by the 25 members of the group for this production amount to 2, 132, 640 CFA Francs. A net profit of 680,343 CFA Francs was made by the group for a cultivated area of 0.49 ha. The book profitability rate and the net margin ratio are 30% and 3.71 respectively. This crop therefore generates revenues that fully cover production costs and is therefore profitable.

Keywords: Profitability-Leaf vegetables- Guinea sorrel- Korhogo.

INTRODUCTION

Urban and peri-urban agriculture is a major concern in sub-Saharan Africa today, which is actually experiencing a rapidly growing population. Indeed, according to Olanrewaju et *al* (2004), the rapid growth of the urban population in tropical Africa undeniably poses the problem of urban food supply. Consequently, urban and peri-urban agriculture is presented as an option that attempts to address the problem of improving food security for urban dwellers, given the poor performance of rural production systems (Kouakou, 2017). In such a context, market gardening seems to be becoming an economic activity that effectively meets urban food demand according to Singbo et *al* (2004).

In Cote d'Ivoire, agriculture has made a significant contribution to the economy and continues to be the cornerstone of the economy (MINADER, 2015). For decades, this dynamism has also included market gardening, which has been doubtful, and represents an undeniable strength for women's communities and particularly for women in the north of the country. These vegetable crops include leafy vegetables. Leafy vegetables, in this case guinea sorrel, are highly valued by the population of Korhogo and constitute an important source of income. Indeed, the leaves of guinea sorrel are used to make local dishes (MINADER, 2014).

However, according to the same source, a diagnostic survey carried out in 2008 showed that very little scientific work has been carried out on leafy vegetables in Cote d'Ivoire.

Almost all of the existing documentation concerns exotic crops, as leafy vegetables have not yet been taken into account in the collection of statistical data from the Office for the Marketing of Food Products (OCPV) and the Ministry of Agriculture (MINADER, 2015).

The objective of this work is to assess the economic profitability of Guinea sorrel in the city of Korhogo with a view to attracting the interest of a larger number of actors.
Specifically, it is:

v. retrace the technical itinerary of sorrel production;
ii. identify the factors of production;
iii. determine production costs;
iv. evaluate revenues;
v. and estimate its profitability.

METHODOLOGY

Choice of study area and data collection

The choice of study area was made in relation to the extent of this culture in the locality. There are lowlands suitable for this crop. There are also women producers specializing in the cultivation of leafy vegetables, the majority of which are sorrel.

In order to conduct our research effectively, of the forty-five (45) people in the Katana group of Natiokobadara, only those who produce guinea sorrel have made up our sample. There are 25 women producers. Data collection was carried out in two phases. The first was to meet the women producers at their production sites. The second one was used to complete the survey questionnaire.

Method of analysis

The data collected are qualitative and quantitative. The quantitative method was used to calculate the position and dispersion parameters. It is also used through frequency tables to characterize variables related to producers and their farms. The qualitative method allowed a better understanding of the findings observed at the analysis level. Thus, an operating account was used to organize information on expenses, income and margins related to sorrel production activities. Secondly, profitability indicators such as the total variable cost ratio and the accounting profitability ratio made it possible to truly assess the financial performance of this crop.

The main elements of the operating account are:

a. The value of total production (VTP)

The VTP is the product of the total quantity produced (Q) in kilograms by the selling price (P) in CFA francs:
VTP = Quantity (Q)* selling price (P), in CFA francs.

b. Total variable costs (TVC)

TVCs are the total costs borne by the producer for all the variable factors.He uses per unit of time. In this study, it concerns inputs, labour, and the cost of acquiring cultivated land.
TVC = AVC* Quantity (Q), with AVC, the average variable cost,
Where AVC is the ratio of total variable cost to quantity produced.

c. Gross margin (GM)

Gross margin is the difference between the value of total production and total variable costs.
GM (GM in CFA francs /m²) = VTP- TVC

d. Net margin (NM)

The net margin is the difference between the gross margin and the fixed costs (Depreciation value).
NM (NM in CFA francs) = GM- TFC (Total fixed cost)

e. The accounting rate of return

The accounting rate of return is the ratio of the net margin to total costs.
ARR= NM / TC

RESULTS

Sociological profile of the actors

Age and gender of operators

The cultivation of guinea sorrel is mainly of interest to women from the adult fringe. They are very active in the production of guinea sorrel. 76% of them are between 35 and 45 years old and 24% are between 45 and 55 years old (Table 1).

Table I: Category and age range of operators.

Category	Male	Female	Percentage
Age			
35- 45 years old	-	19	76%
45- 55 years old	-	6	24%
TOTAL	-	25	100%

Literacy level

The illiteracy rate is 92% (Figure 1). It is high and therefore hinders the organization and autonomy of women producers in the full management of their activity.

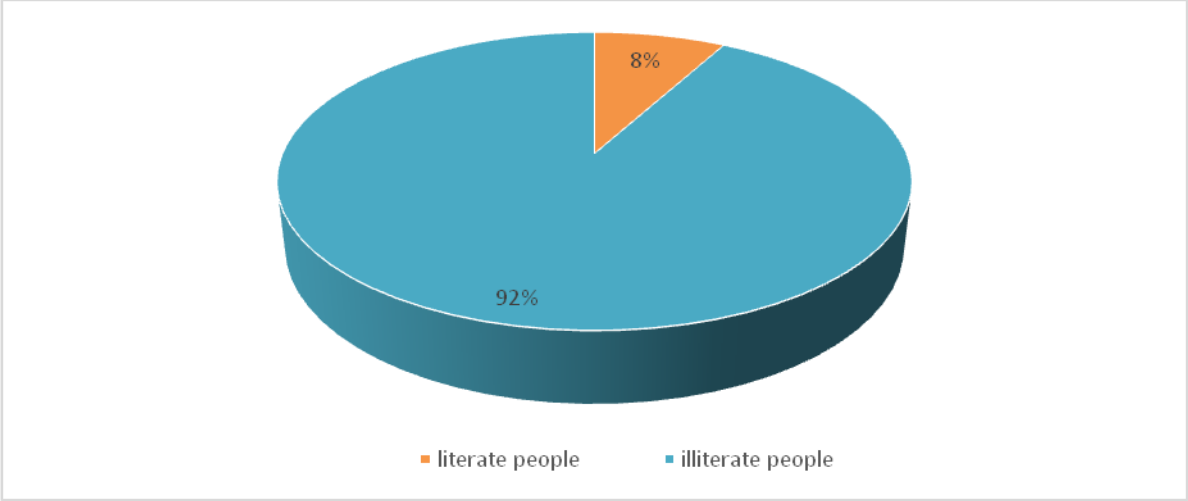

Figure 1: Literacy level

Supervision of the members of the group

For more than 10 years, the 25 producers of guinea sorrel have been supervised in good agricultural practice.

Area of sites operated

The area planted varies from 50 m² to 640 m². Guinea sorrel is grown in this locality over a total area of 0.49 ha.

Seed acquisition mode

All women producers obtain their seed from the local market. However, 64% of them buy guinea sorrel seeds for cash on the local market and 36% on credit (Table 2).

Table 2: Seed acquisition by method of payment and origin

Seed acquisition	Cash payment	Credit payment	Total
	(number of women producers)	(number of women producers)	
Local market	16	9	25
Proportion(%)	64	36	100

Technical itinerary for the production of guinea sorrel

The soil prepared to support guinea sorrel grains must be well drained, moist and fresh. Compost or decomposed manure should be added to the plantation. Guinea sorrel is grown by direct seeding or by cutting. The seed must be covered with refined soil to a depth corresponding to two (2) times its diameter.

It is important to note that Guinea sorrel is produced three (3) times a year: in March, May and also in December. Sowing should be done in a warm place in March. The seeds are generally very hard, a soaking of 48 hours, before sowing, allows a better germination. The seeds can be recovered for future planting. They retain their germinative faculties for 5 years. When growing in pots, a good drainage layer is required.

Guinea sorrel leaves can be harvested 30 to 45 days after sowing.

Analysis of production factors

Cultivated land

88% of women farmers rent cultivated land compared to only 12% who own it (Table 3).

Table 3: Distribution of women producers by land acquisition method

	Rental	Property title	TOTAL
Employees	22	3	25
Proportion(%)	88	12	100

Labor force

The exploitation of guinea sorrel is manual. Family and salaried labour are in high demand. Remuneration is paid on a daily basis and the cost varies from one crop year to another regardless of the time worked**.**

Share capital

The rudimentary capital used is composed of small hoe, machete, hoe, sump, backpack sprayer, buckets, large hoe, watering can and rake.

Price fluctuation

The vegetable market is a free and unorganized market. Prices are set by comparing supply and demand. When demand is strong in the market, the price increases and when demand is low, the price decreases. During the rainy season, market gardening prices are low because supply is greater than demand. The price of sorrel leaves varies from 150 to 250 CFA francs depending on the season**.**

Marketing channel

The actors involved in the marketing of both leafy and fruit vegetables are women. Unlike other crops, vegetables as a whole and especially leafy vegetables do not have an organized and structured market, especially since the sale and consumption of these leaves are purely local. The sale is made either with an intermediary or directly. In the case of guinea sorrel, the producers themselves sell directly on the market.

Production evaluation

On one 10 m² furrow, the quantity of leaves harvested is sold at a price of 4,000 CFA francs per bag in December and 1,500 CFA francs per bag during the months of May and July. On the other hand, on one (1) furrow of 7 m², the quantity of leaves harvested is sold at a price of 2,800 CFA francs per bag in December and at 1,050 CFA francs per bag during the months of May and July. Tables 4 and 5 give an overview of the value of production in these different months according to the number of train paths and the area of the path.

Table 4: Value of production in December 2017

	Number of women producers	Total number of train paths	Area of the train path	Amount in FCFA of leaves sold per train path	Amount of production in CFA francs
	19	334	10 m²	4, 000	1, 336, 000
	06	148	07 m²	2, 800	414, 400
Total	25	482	-	-	1, 750, 400

Table 5: Value of production in May and July 2018

	Number of women producers	Total number of train paths	Area of the train path	Value in CFA francs of sheet sold per train path	Amount of production in CFA francs
	6	334	10 m²	1, 500	310, 800
	19	148	07 m²	1, 050	1, 002, 000
Total	25	482	**-**	**-**	1,312, 800
Total value of production		**-**	**-**	**-**	**3, 063, 150**

Evaluation of fixed charges

Fixed costs correspond to the amount of depreciation of small equipment. This small equipment consists of small hoe, machetes, hoes, large hoe, watering cans, rakes, buckets, basins and a sprayer (Table 6).

Table 6: Depreciation of equipment over its useful life (CFA francs)

material	number	price per unit	amount	lifetime (year)	depreciation
Small hoe	75	750	56,250	2	28,125
machetes	25	3,000	75,000	2	37,500
hoes	25	700	17,500	2	8,750
large hoe	25	2,500	62,500	2	31,250
watering cans	50	5,500	275,000	3	91,667
Sprayer	1	18,000	18,000	3	6,000
Rake	25	1,500	37,500	2	18,750
Bucket	25	1,000	25,000	2	12,500
Sink	25	1,250	31,250	2	15,625
TOTAL			334, 000		**250, 167**

Assessment of variable costs

The components of the variable cost are the cost of seed, fertilizer, pesticides, fungicides and labour (Table 7). The workforce is estimated at 6500 CFA francs per 100 m². This is the most important variable charge.

Table 7: Variable loads

Labelled	Amount (CFA francs)
Seed	219, 600
Fertilizer (NPK and UREE)	138, 000
Pesticides, fungicides and herbicides (Decis, Espoir, cypercal50EC, cypermak, mancomax, chicken droppings)	268, 000
Rental of the cultivated plot	319, 540
Labour force	1, 187, 500
Total	2, 132, 640

Operating account

The analysis in Table 8 shows that the cultivation of guinea sorrel has very high variable costs (2,132,640CFA francs). The maintenance, fertilization and treatment of the crop as well as the purchase of inputs have very high costs. However, the net profit realized of 680,343 CFA francs is interesting.

Table 8: Operating account of the Katana group of Natiokobadara

Products	Unit	Quantity	Unit price CFA francs	Amount CFA francs
Sale of production				3, 063, 150
TOTAL REVENUE				3, 063, 150
CHARGE				
I- Purchase of production factors				
Chickendung	bag	86	500	43, 000
Guinea sorrel grain	kg	244	900	219, 600
Fertilizers				
NPK	kg	230	350	80, 500
UREA	Kg	230	250	57, 500
herbicide, pesticide and fungicide				
Decis	ml	25	500	12, 500
Cypercal	ml	25	1,000	25, 000
Cypermak	ml	25	4,500	112, 500
Mancomax	g	25	2,000	50, 000
Espoir	ml	25	1,000	25, 000
Rental of land	m^2	4, 916	6,500 for the 100m^2	319, 540
TOTAL INPUT COST				945, 140
II- Production costs				
Setting up the culture				
Labour	Men per day	25	2,500	62, 500
Production of boards	Men per day	25	1,000	25, 000
Direct sowing	Men per day	25	1,000	25, 000
TOTAL IMPLEMENTATION OF CULTURE				112, 500
III- Maintenance and fertilization of the plot				
Maintenance				
Hoeing bag	Men per day	25*2 days	1,000	50, 000
Watering	Men per day	25*30 days	1,000	750, 000

Fertilization				
Supply of chicken droppings	Men per day	25	1,000	25, 000
NPK supply	Men per day	25	1,000	25, 000
Urea supply		25		
Processing	Men per day	25	1,000	25, 000
Decis supply	Men per day	25	1,000	25, 000
Mancomax supply	Men per day	25	1,000	25, 000
Cypercal supply	Men per day	25	1,000	25, 000
Cypermak supply	Men per day	25	1,000	25, 000
Espoir supply	Men per day	25	1,000	25, 000
Total Maintenance, Fertilization And Treatment				1, 000, 000
IV- Harvesting				
Manpower	Men per day	25*30 days	100	75, 000
Total Collected				75, 000
Total Production Costs				2,132, 640
Total Fixed Cost				250, 167
Total Cost Of Production				2,382, 807
Net Income (Profit)				680, 343

Financial profitability indicators

The group achieves a gross margin and a net margin of 930,510 FCFA and 680,343 FCFA respectively. The accounting profitability ratio is 30%. The net margin ratio is 3.71. The cultivation of sorrel is therefore profitable.

Table 9: Financial profitability indicators

Product	**Amount in CFA francs**
Turnover (T= Quantity*price)	3, 063, 150
Variable expenses (CE)	2,132, 640
Gross margin (GM= T-VE)	930, 510
Fixed charges (CF)	250, 167
Net margin (NM=GM-FC)	680, 343
Ratios	
Net margin ratio (GM /FC)	3.71
Accounting profitability ratio (NM/TC)	0.30

DISCUSSION

Market gardening in Korhogo is generally practiced by women. They are responsible for producing the vegetables for the sauce. This result is similar to Kra's (2012) estimate that this dominant presence of women is explained by the fact that men are more oriented towards perennial crops (Mango, Cashew nuts, Cotton...).

An analysis of the age of female producers shows that 76% of them are between 35 and 45 years old and 24% are between 45 and 55 years old. This result implies that the culture of guinea sorrel is of more interest to the adult fringe and less to young people. This could be explained by the fact that young people do not find any monetary interest in it and prefer crops such as onions instead. This result justifies Zarationon's (2016) assertion that onion production is a young people's business. It is one of the best ways for them to get money.

Most of the women who produce guinea sorrel are illiterate (92%). This could be found in the fact that parents predestined their daughters for the matrimonial home and rather their young boys for school. This result supports Adouko's (2016) result in his study on the profitability of cabbage in the Bagoué region.

The members of the Katana group benefit from the technical assistance of the management structures. This follow-up has been ongoing for more than 10 years. Indeed, they benefit from the expertise of these structures in market gardening. They also ensure that the technical itinerary is properly applied. This result is different from that of Sékongo (2014) in its study on the analysis of the shea processing link in the department of Korhogo. Indeed, this study reveals that the women who process shea butter in this locality do not receive supervision or assistance and training from the structures. According to this author, this difference can be explained by the inorganization of women producers in the shea sector.

In the locality of Natiokobadara, guinea sorrel, spinach, red pigweed and lettuce are the most common and occupy the largest areas, ranging from 50 to 640 m2. This observation differs from that of Yeo (2014), which presents aubergine, chilli, tomato, lettuce, and cabbage as those that occupy the largest areas in the Dikodougou sub-prefecture. In fact, the agro-ecological specificities of the study area explain these different choices.

The supply of guinea sorrel seed is entirely on the local market and according to two (2) modes: 36% on credit and 64% on own funds. Women producers do not receive financial and material support from management structures and donors. This result differs from Adouko's (2016) result. Indeed, it attests that the cabbage producers of the Bagoué region, particularly those of the DjiguiyaKabada groups in Boundiali and Katana in Kasséré, have received the seeds from the structures that supervise them. However, she explains that this gesture is part of the financial empowerment of women, the main objective of the donor.

Most women producers rent the land (88%). This high rate is justified by the fact that land ownership is rarely given to women in this locality according to tradition. This result is the same as that of Kouakou (2014) who mentions that women rarely receive or inherit valuable land permanently with exclusive rights.

On local markets, demand for leafy vegetables is strong. Prices vary from season to season. This result is the same as that of Kouakou (2019), who shows that the price of agricultural products fluctuates according to the seasons.

The overall turnover is 3,063,150 CFA francs, or an average of 255,262 CFA francs per month. The accounting rate of return on guinea sorrel is 30%. In addition, the net margin ratio is 3.71. The cultivation of sorrel is a profitable activity. It generates revenues that fully cover production costs and generate profits. This observation is made by Kouakou (2017) in his study on the performance of urban agriculture in the Abidjan district. Indeed, this author confirms that the profitability of market gardening remains undeniable because of the ever-increasing demand due to population growth.

CONCLUSION

At the end of our study, we conclude that the production of guinea sorrel is a source of income for women producers. These women, the majority of whom are adults and illiterate, represent the fringe of the most active population. In addition, the sale of guinea sorrel makes it possible to meet domestic charges.

The total cost of the expenses is estimated at 2, 132, 640 CFA francs when sales are estimated at 3, 063, 150 CFA francs. The net profit realized by the women producers is 680,343 CFA francs. The sorrel crop is profitable at a rate of 30% and the net margin ratio is 3.71. It therefore generates income that fully covers production costs and allows women producers to make a profit.

However, in the practice of this crop, women producers face certain difficulties in this case, the unavailability of water, especially in the dry season, the high cost of chemical inputs, the destruction of certain plants by animals and the lack of financing.

REFERENCES

Adouko A. J.M., 2016. Analysis of the profitability of cabbage cultivation in the Bagoue region: case of the djiguiyakabada market gardening perimeters of Boundiali and katana of Kassere. Licence thesis, UPGC Korhogo, pp 30-31.

Kouakou K. III, 2014. Diagnostic of cotton production performance in Cote d'Ivoire, 2014, Review of theoretical and applied economics, Volume 4 - Number 1, p. 75-96

Kouakou K.P.A., 2017. Evaluation of the technical performance of urban agriculture in the Abidjan district, European scientific journal, p 288- 301p.

Kouakou K.P.A., 2019. The approach of the Policy Analysis Matrix to the study of the cashew nut sector in Cote d'Ivoire, International journal of Business Management and Economic Research, Vol 10 (1), 2019, 1534-1542.

Kra G. Y., 2012. State of production factors in urban and peri-urban agriculture in Korhogo: case of market gardening. Licence thesis, UPGC Korhogo, 35p.

MINADER, 2014. National census of agricultural holdings in Cote d'Ivoire, final report of the Ministry of Agriculture and Rural Development (MINADER), Abidjan, 50p.

MINADER, 2015. Master plan for horticulture in Cote d'Ivoire, Commodities and Agricultural Diversification Branch, Abidjan, 167p.

Olanrewaju B.S., Moustier P., Mougeot L., Abdou F., 2004. Sustainable development of urban agriculture in French-speaking Africa. Issues, concept and method. CIRA, CRDI.

Sékongo K. E., 2015. Analysis of the shea processing link in the department of Korhogo. licencethesis, UPGC Korhogo, 33p.

Singbo A., Nouhoheflin T., Idrissou L., 2004. Study of perceptions on vegetable pests in peri-urban areas of southern Benin. Quality vegetable project, Activity report, IITA- INRAB- OBEPAB, 21p.

Yeo F., 2014. Market gardening system in the Dikodougou sub-prefecture. Licence thesis, UPGC Korhogo, 23p.

Zarationon S., 2016. Analysis of the profitability of onion cultivation in the department of Korhogo: case of producers in the sub-prefecture of Niofoin. Licence thesis, UPGC Korhogo, 33p.