International Journal of Social Sciences and Humanities Invention 12(09): 8725-8733, 2025
DOI: 10.18535/ijsshi/v12i09.02
ISSN: 2349-2031
https://valleyinternational.net/index.php/theijsshi

Agricultural Credit in Rural Communities: Performance and Perception in Maize Farming in The Department of Odienné (Côte d'Ivoire)

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Abstract:

Food security is an important pillar of agricultural policies in sub-Saharan Africa. Among food crops, maize plays a crucial role in ensuring the nutritional balance of populations in northern Côte d'Ivoire. To support its production, an input credit mechanism has been initiated in the Odienné department. This study evaluates the effects of credit on agricultural performance and attempts to capture the perceptions related to this type of investment. It is based on a mixed quantitative and qualitative approach. The survey was conducted in five localities in the Odienné department with 104 producers. Two focus groups of four people each were conducted to understand the beneficiaries' relationships with maize cultivation and agricultural credit. An analysis of variance was applied on yield variables. Among the beneficiaries, productivity decreased from 2019, before the project, to 2020 from 1067 ±844 Kg/ha to 1022 ±518 Kg/ha, and increased from 2020 to 2021, respectively from 1022 ±518 Kg/ha to 1311 ±1068 Kg/ha. There is a significant difference in farm productivity depending on whether producers receive input credit or not. Overall, no significant difference was observed between the yields for the years 2019, 2020, and 2021. Practically, the input credit project is not profitable for manual and animal-drawn technics applied on maize cultivation. Despite these significant deficits, the attachment to maize cultivation is explained by the fact that this crop is grown primarily to meet self-consumption needs and not as a cash crop.

Keywords: **Inputs credit, Maize, Productivity, Perception, Self-consumption, Korhogo.**

Introduction

Since independence in 1960, the agricultural sector has always held a central role in the economy and development of Côte d'Ivoire, both in terms of the agricultural workforce and its contribution to national wealth creation. In 2022, the agricultural sector accounted for about 20% of Côte d'Ivoire's Gross Domestic Product and employed nearly one in two people of working age **(INS, 2023)**. This strong representation of the agricultural sector in the economy may, however, hinder the country's overall development and expose farmers to the instability of agricultural markets, making them more vulnerable in an already challenging context **(FAO, 2015, 2019)**.

Indeed, agricultural producers are among the most vulnerable socio-professional groups. Despite a slight recent improvement, over 58% of the rural population remains below the poverty line, while the national poverty rate decreased from 39.4% in 2018 to 37.5% in 2021, according to the second harmonized household living conditions survey **(Ducroquet and *al.*, 2017; AfDB, 2024)**.

Given the characteristics of rural areas in Côte d'Ivoire, developing the agricultural potential of the regions could serve as a powerful lever in the fight against poverty, aiming to improve the well-being of rural populations. To achieve this, a qualitative transformation of production systems is necessary **(Bosc, 2015)**. This transformation would involve mobilizing substantial capital for the acquisition of production inputs and strengthening the operational capacities of stakeholders.

In this context, agricultural credit has long been seen as a major constraint on farmers, potentially preventing them from modernizing their farms and increasing their income **(Djato, 2001)**. However, major government initiatives to address the rural credit demand such as the National Bank for Agricultural Development (BNDA) and, more recently, the Bank for Agricultural Financing (BFA) have both ended in failure **(N'ZI, 2014).**

To explain these failures, in addition to management issues within financial institutions, one must consider the perception and use of credit by rural producers. According to **Badouin (1973)**, the most commonly observed social and mental structures in African agricultural communities are poorly suited to credit systems, particularly because mortgage guarantees standard in most credit arrangements are often inapplicable in these settings.

To compensate for this limitation, certain agricultural support programs have introduced a mechanism that provides farmers with inputs on credit, commonly known as input credit. This system is based on the producer's commitment to exclusively sell their harvest to the contracting organization. After deducting the value of the loaned inputs from the total harvest value, the organization returns the remaining cash balance to the producer.

The Union of Cooperative Societies of Côte d'Ivoire (UFACOCI COOP CA), specializing in cotton farming, piloted an input credit initiative with some of its members as part of efforts to diversify its activities. Support for maize production was introduced through the dissemination of high-yield seed varieties, recognizing the importance of this crop for food security **(RONGEAD, 2016).**

This study, conducted in the department of Odienné, assesses the potential impact of the program on the technical and economic performance of maize producers and explores their perceptions of credit in relation to the outcomes observed.

1. Methodology

1.1. Materials

The biological material in this study is maize (*Zea mays*), specifically the "Komsaya" and "Kabamonoj F1" varieties promoted by the input credit program. These varieties are known for their high productivity, potentially reaching 10 tons per hectare **(CALLIVOIRE, 2019).**

The target population consists of maize producers in the department of Korhogo, divided into two categories: beneficiaries of the credit program and non-beneficiaries. The latter use standard, non-specialized inputs.

The technical materials include a questionnaire, and an interview guide administered to maize producers. The questionnaire collected data on the socio-demographic profiles of farmers, characteristics of their farms, and the cost of production inputs. The interview guide explored farmers' mindsets and perceptions related to maize production and the input credit program. It was designed to identify: the objectives of maize production, expectations regarding a credit program, ideals related to family and professional life, feedback from the support received, and future perspectives for farming activities.

1.2. Methods

1.2.1. Selection of the study area

The main criterion for selecting the study area was the existence of UFACOCI's input credit program. Based on this, the department of Odienné was chosen (Figure 1). Five villages corresponding to all localities involved in the program within the department were visited for the survey operation (Table 1).

1.2.2. Data collection

According to its records, the cooperative union lists 98 producers as beneficiaries of the input credit program in the department of Odienné. As a full census of this population was not feasible, the minimum sample size was determined using the formula of **Pires (1997)**, as cited by **Kane (2019)**. With a confidence level of 90% and a sampling margin of error of 10%, the minimum required sample size was set at 39 producers.

In practice, 52 producers out of the 98 were surveyed as part of the study, resulting in a sampling rate of 53%. To enable a comparative approach, the sample included an equal number of program beneficiaries and non-beneficiaries ($n = n_1 + n_2$; $n_1 = n_2$), for a total of 104 producers.

To select producers for the survey, simple random sampling by drawing lots was applied in each locality, ensuring at least the minimum sampling rate of 40% for beneficiaries residing in each village. Non-beneficiaries were selected using the snowball sampling method **(Johnston and Sabin, 2010)**, meaning that after completing their interview, each producer guided the researcher to another producer, who was then automatically added to the sample.

Data collection from the farms was conducted in coordination with the work schedule of agricultural advisors responsible for farmer support, between May 25 and September 20, 2022. Based on initial quantitative analysis results, two focus groups of four program beneficiaries each were organized in the localities of Niamana and Gbahanla, to better understand the perceptions and reasoning related to the concept of credit.

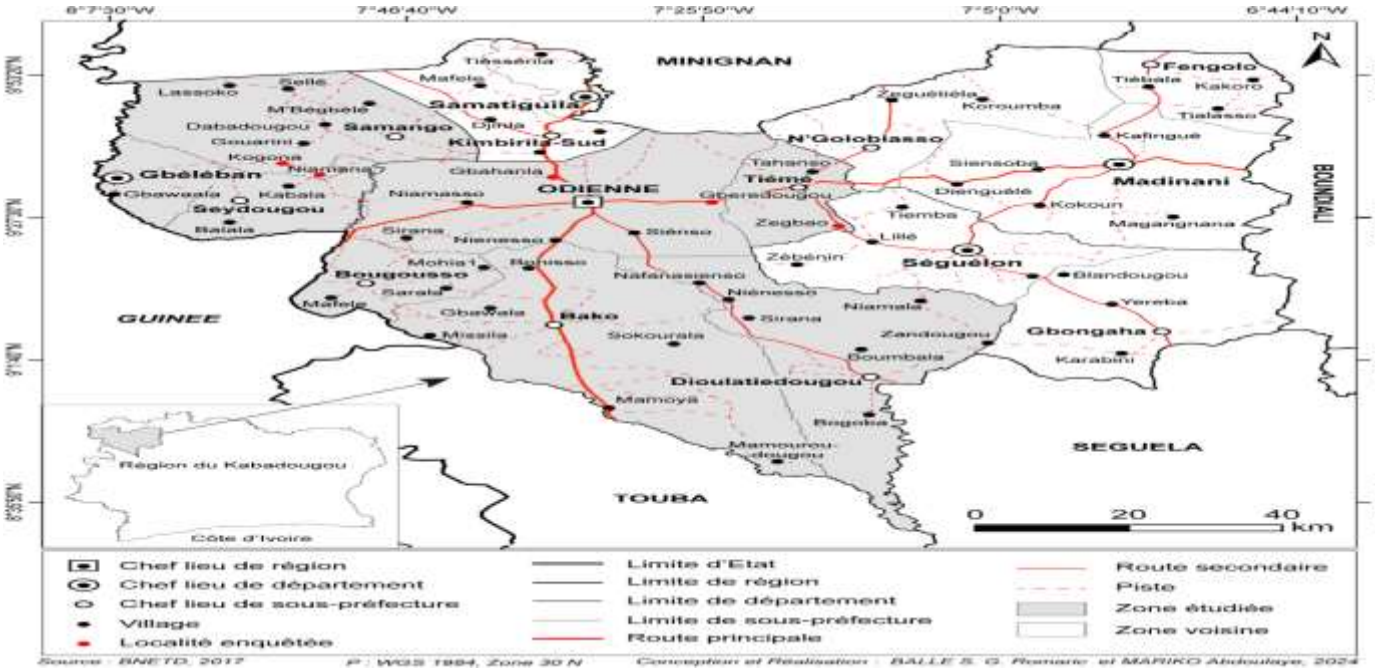

Figure 1: Presentation of the study area in the department of Korhogo

Table I: Distribution of surveyed producers by locality

Locality	Beneficiaries	Non-beneficiaries
Kogona	20	20
Zégbao	10	10
Niamana	10	10
Gberedougou	6	6
Gbahanla	6	6
Total per category	**n_1 = 52**	**n_2 = 52**
Total	**n = 104**	

1.2.3. Data Analysis

The data analysis required the categorization of the farm sizes managed by the surveyed producers into small (SF)**,** medium (MF)**,** and large (LF) maize farms. This classification was based on the quartile method applied to the cultivated areas recorded in the registers for the 2019, 2020, and 2021 farming seasons **(Delhumeau, 2002; Insee, 2016)**.

- The first quartile of land areas corresponds to the category of small farms (SF)**.**
- The second and third quartiles were merged to form the category of medium farms (MF)**.**
- The fourth quartile represents the large farms (LF)**.**

Given the year-to-year variability in farmed areas, the quartile thresholds differ depending on the agricultural season. The resulting classes are presented in Table II.

Table II: Categorization of Farms in the Department of Odienné

	2019	2020 and 2021
Small farm (SF)	Surface <1ha	Surface < 1ha
Medium farm (MF)	1ha ≤ Surface ≤ 3ha	1ha ≤ Surface ≤ 2ha
Large farm (LF)	Surface >3ha	Surface > 2ha

The data analysis involved comparing variables related to maize production using descriptive statistics and a two-way analysis of variance (ANOVA II). The ANOVA was used to compare temporal variations in maize yields, depending on whether the producer was a beneficiary of the input credit program or not. The Student-Newman-Keuls (SNK) multiple mean comparison test was applied to identify parameters with homogeneous variances **(Studer *and al.*, 2009; Laurencelle, 2017)**.

The performance indicator chosen to evaluate profitability was the net operating result (NOR). This was calculated based on an operating account structured into two components: operating expenses and operating revenues **(Schmidt, 2021)**. Both actual and estimated costs were considered for certain factors, such as family labor and land capital. The break-even price i.e., the price at which the net operating result equals zero was also determined **(Levrel *and al.*, 2012; Ballé *and al.*, 2017)**.

The perception analysis was based on the five principles of the diffusion of innovation theory as outlined by **Moore and Benbasat (1991)** and **Rogers (1995)**. These principles are: (i) Relative advantage of the innovation; (ii) Compatibility with existing values, past experiences, and social norms of the community; (iii) Complexity of understanding and use; (iv) Trialability of the innovation and (v) Observability, i.e., the clarity and visibility of the innovation's results.

2. Results

2.1. Sociodemographic profile of respondents

Table III presents the sociodemographic characteristics of the maize producers in the study. The sample is composed exclusively of men (100%), with 40% of input credit beneficiaries and 45% of non-beneficiaries falling within the 36 to 45-year age group. Producers under the age of 25 and those in the 56–65 age bracket are very underrepresented in both groups. Half of the beneficiary producers had received formal education, while three-quarters of non-beneficiaries had not. Nearly all respondents are married (99%).

Table III: **Sociodemographic Characteristics of Maize Producers**

	Beneficiaries	Non-Beneficiaries
Gender	Men : 100 % Women : 0 %	Men : 100 % Women : 0 %

Age	Less than 25 years 0 % 25-30 years : 2.5 % 36-45 years : 40 % 46-55 years : 35 % 56-65 years : 22.5 %	Less than 25 years : 2.5 % 25-30 years : 25 % 36-45 years : 45 % 46-55 years : 17.5 % 56-65 years : 10 %
Educational level	Unschooled : 50 % Primary : 25 % Secondary : 25 %	Unschooled : 77.5 % Primary : 17.5 % Secondary : 5 %
Marital status	Married : 100 % Bachelor : 0 %	Married : 97.5 % Bachelor : 2.5 %

2.2. Technical performance of input credit beneficiaries and non-beneficiaries

Table IV presents the agronomic characteristics of the farms, categorized according to whether the producers were beneficiaries of the input credit program or not. In this analysis, maize cultivation area and yield are used as key indicators to evaluate producers' technical performance. Overall, non-beneficiaries experienced an increase of about 0.3 hectares in their maize cultivation area between 2019 and 2021. The coefficient of variation (CV) of 50% indicates low variability in the cultivated areas.

For beneficiaries, there was first an increase in cultivated area from 2019 to 2020 (approximately 0.3 ha), followed by a decrease of about 0.6 ha from 2020 to 2021, accompanied by a decline in the number of producers involved in the project. The variability in cultivated area was relatively similar between the two groups. It is important to note that the input credit project was implemented in 2020 and 2021.

Regarding yield, non-beneficiaries saw a decline in average productivity from $1{,}067 \pm 844$ kg/ha in 2019 to 832 ± 420 kg/ha in 2021. The average CV of 58% indicates moderate variability in yield among this group.

Among beneficiaries, productivity slightly decreased from $1{,}067 \pm 844$ kg/ha in 2019 to $1{,}022 \pm 518$ kg/ha in 2020, then increased to $1{,}311 \pm 1{,}068$ kg/ha in 2021. Notably, yield variability was very high in 2021 among credit beneficiaries, with a coefficient of variation around 81%. In contrast, the 2020 farming season showed low variability in maize yields.

Table IV: **Descriptive statistics of production with and without the project from 2019 to 2021**

Category	Season	Surface average (ha)	Coefficient of Variation (CV)	Yield average (Kg/ha)	Coefficient of Variation (CV)
Non Beneficiaries	2019 (n=96)	1,6 ±0,9	0,56	1067±844	0,79
	2020 (n=50)	1,4 ±0,7	0,50	1048 ±453	0,43
	2021 (n=50)	1,9 ±0,9	0,47	832 ±420	0,50
	Total (n=196)	1,6 ±0,8	0,50	982 ±572	0,58
Beneficiaries	2020 (n=50)	1,9 ±1,1	0,58	1022 ±518	0,51
	2021 (n=43)	1,3 ±0,6	0,46	1311 ±1068	0,81
	Total (n=93)	1,6 ±0,9	0,56	1166 ±793	0,68

2.3. Effects of the project factor and year factor on farm productivity

Table V presents the results of the analysis of variance (ANOVA) applied to maize yields. The findings reveal a significant difference in farm productivity depending on whether producers were beneficiaries of input credit or not ($F = 3.66$; P-value = 0.05). Overall, no significant difference was observed between the yields for the years 2019, 2020, and 2021 ($F = 0.74$; P-value = 0.48). However, the average productivity of the farms shows a significant difference under the combined effect of input credit and time ($F = 4.56$; P-value = 0.03).

Table V: Results of the two-way ANOVA of yield according to project and year factors

Source	Type III sum of square	ddl	Mean square	F	Significance
Corrected model	3904797[a]	4	976199	2,05	0,09
Constant	204854853	1	204854853	430,84	**(HS)** 0,00
Project	1739988	1	1739988	3,66	**(S)** 0,05
Year	705019	2	352509	0,74	0,48
Project * Year	2171297	1	2171297	4,56	**(S)** 0,03
Error	104129330	219	475476		
Total	345569887	224			
Corrected total	108034128	223			

a. R-square = 0.36 (Adjusted R-square= 0,59)

The multiple comparison of average yields by year showed that the 2019, 2020, and 2021 farming seasons form a single homogeneous group. No individual agricultural year stands out from this group (Table VI).

Table VI: Results of the multiple comparison of yield by year (SNK)

		Subset
Years	**N**	**1**
2021	93	983,22
2020	104	1037,29
2019	98	1067,06
Significance		0,738

2.4. Economic performance of maize farms held with manual and animal-drawn technics in 2020

The parameters of the operating accounts, developed according to farm size and producer category, are presented in tables VII and VIII. The accounts were structured based on the type of maize cultivation, namely manual farming and animal-drawn farming.

It appears that, whether considering actual production costs only or the sum of actual and estimated costs, the operating accounts consistently show deficits.

- For non-beneficiaries using manual farming, the net balances are –64,603 CFA francs/ha (actual costs) and –242,853 CFA francs/ha (actual + estimated costs).
  In this case, the break-even prices (P*) i.e., prices required to eliminate the operating deficit are 168 CFA francs/kg and 352 CFA francs/kg, respectively.
- For beneficiaries of input credit using manual farming, the deficits amount to –185,183 CFA francs/ha (actual costs) and –318,933 CFA francs/ha (actual + estimated costs), with break-even prices of 278 CFA francs/kg and 413 CFA francs/kg, respectively.

These trends are similar for medium and large farms using animal-drawn farming, both for beneficiaries and non-beneficiaries of input credit. Beyond the consistently negative operating balances in all scenarios, the break-even prices (P*), ranging from 341 to 532 CFA francs/kg, highlight the significant gap between revenues and total (actual and estimated) costs.

Overall, the input credit program is not profitable under either manual or animal-drawn cultivation, whether for medium-sized or large farms, even when only actual costs are considered.

The inclusion of estimated production factor costs those not involving direct financial outflows further worsens the deficit for all farms.

Table VII : Farm account of producers using animal traction in 2020

			ting Capital (F CFA/ha)		dor Capital (F CFA/ha)			and Capital (F CFA/ha)		Total (FCFA/ha)		Production average (Kg/ha)	Price average (F/Kg)	NET OPERATING RESULT (FCFA/ha)	
				Actual Costs	Estim. Costs		Actual Costs	Estim. osts	Actual Costs	Estim. s	Actual Costs	Estim. s			Actual Costs	Actual & Estim. costs
Medium farms (1ha≤ Sf < 2ha)	**Project 12/32**	Inputs	171, 100	0	Workforce	25, 000	52, 500	0	120, 000	231, 261	207, 500	1097.21 ***±578***	90	-132, 512 ***P*= 211F***	**-340, 012 *P*= 400F***
		Depreciation	35, 161	35, 000											
	No Projet n=17/26	Inputs	84, 675	2, 000	Workforce	35, 000	40, 000	0	170, 000	152, 816	247, 000	1 139 ***±407***	100	-38, 908 ***P*= 135F***	**-285, 908 *P*= 351F***
		Depreciation	33, 141	35, 000											
Large Farms (Sf>2Ha)	**jet /9**	Inputs	171, 100	0	Workforce	42, 500	37, 500	0	30, 000	228, 544	102, 500	711.6 ***±251***	90	-164, 504 ***P*= 322F***	**-267, 004 *P*= 466F***
		Depreciation	14, 944	35, 000											
	No Projet n=3/10	Inputs	90, 925	2, 000	Workforce	41, 250	58, 750	0	30, 000	145, 699	125, 750	510 ***±357***	100	-94, 657 ***P*= 286F***	**-220, 407 *P*= 532F***
		Depreciation	13, 524	35, 000											

P* = critical price, which is the price that cancels out the operating result.

Table VIII: Farm account of producers using manual cultivation in 2020

		ting Capital (F CFA/ha)			dor Capital FA/ha)			Land Capital (F CFA/ha)		Total (FCFA/ha)		Production average (Kg/ha)	Price average (F/Kg)	NET OPERATING RESULT (F CFA)	
			Actual Costs	Estim. Costs		Actual Costs	Estim. Costs	Actual Costs	Estim. Costs	Actual Costs	Estim. Costs			Actual Costs	Actual & Estim. costs
Medium farms (1ha≤ Sf < 2ha)	**Projet n=9**	Inputs	171, 100	0	Workforce	33, 750	43, 750	0	90, 000	274, 183	133, 750	988.9 ***±372***	90	-185, 183 ***P*= 278F***	**-318, 933** ***P*= 413F***
		Depreciation	69, 333	0											
	No Projet n=14	Inputs	79, 775	2, 000	Workforce	28, 750	36, 250	0	140, 000	160, 996	178, 250	964 ***±458***	100	-64, 603 ***P*= 168F***	**-242, 853** ***P*=352F***
		Depreciation	52, 471	0											

P* = critical price, which is the price that cancels out the operating result.

2.5. Perceptions of the input credit-based maize production support project

2.5.1. Foundations of maize production in northern Côte d'Ivoire

Various reasons have led farmers to engage in agriculture. One major reason is that many have inherited land from their fathers, and they feel a responsibility to continue cultivating it. A second reason that emerged during interviews is that some farmers, not having performed well in school, chose to return to farming rather than loiter aimlessly in the village.

All the farmers share a common goal in practicing agriculture: to meet their family's needs and improve their living conditions. They often expressed this sentiment by saying, "We're not government workers like others. If we don't farm, how will we feed ourselves and care for our families?" Agriculture is thus seen as a profession passed down through generations.

2.5.2. Strategic vision of the project promoter vs. logic of maize producers

The promoter's vision and mission is to improve the living conditions of its members by supplying them with inputs and other production resources necessary for their agricultural activities. The promoter aims to increase maize production, conquer international markets, and eventually achieve local processing of maize. To support this vision, one project leader stated:

"Côte d'Ivoire should not limit itself to merely producing raw agricultural products. It should also think about processing them to create greater added value. Why not do the same for maize, which is widely used in food products?"

However, interviews revealed that for the producers, the primary objective of maize cultivation is family consumption. They emphasize that maize is the staple food in the North, which is why it has been grown for generations. Some of the stored maize is sold only in cases of urgent financial need, something that is not possible with crops like cotton or cashew nuts. Thus, maize is fundamentally a subsistence crop.

2.5.3. Clash between the promoter's vision and beneficiaries' perceptions

Although the two visions converge in several respects, a key divergence lies in the strategic orientation of production. The UFACOCI project seeks to shift the focus from a centuries-old subsistence agriculture system—especially for maize—toward market-oriented production.

The provision of inputs on credit to intensify production introduces a new dynamic that does not align with the inherited worldview of the project's beneficiary farmers. In other words, while both parties share the goal of achieving improved well-being, their paths and means to that goal differ.

The promoter's motivations are not deeply rooted in the cultural consciousness of the maize producers. This mismatch highlights a tension between modernization strategies and traditional farming practices.

3. Discussion

Maize yields obtained with traditional seeds are low, ranging between 0.8 and 1.3 tons per hectare in the Odienné region. This can likely be attributed to the poor quality of seeds used and the deterioration of their agronomic potential over successive growing seasons. **Fusillier (1994)** highlighted the aging of traditional seeds, which are reused year after year, thereby reducing their yield potential. In addition to these factors, there are also poor farming practices, soil depletion, and climate change **(Noufé, 2015; Koffi & N'Dri, 2020).** These findings are consistent with those of **Yéo (2021)**, who identified the main constraints on maize productivity and estimated the national average yield to be between 0.6 and 3 tons per hectare. However, the productivity observed in the study locations remains well below the agronomic standard of 3 T/ha. The study results show that farms using hybrid varieties introduced by the input credit promoter achieved significantly higher productivity compared to farms outside the project, which generally used local seed varieties. These findings align with those of the West and Central African Council for Agricultural Research and Development (CORAF/WECARD), which demonstrated that hybrid varieties, like those introduced by the input credit program, offer competitive agronomic advantages in terms of yield and production cycle. However, good farming practices and adequate

fertilization are required to fully realize their potential **(CORAF/WECARD, 2018).**

From this perspective, the ANOVA results showed only marginally significant and weakly discriminative positive effects for producers benefiting from the input credit in Odienné (F = 3.66; P-value = 0.05; SNK P-value = 1). The statistical analysis of yields revealed no significant differences across the 2019, 2020, and 2021 seasons (F = 0.74; P-value = 0.48). This consistency in production results may be due to a stable production environment marked by worsening climate change and the limited technical capacity of producers in the region **(Noufé, 2015).** For instance, one year might benefit from a good rainfall distribution, while the next could suffer from early cessation of rains—impacting the maize crop's critical water need period, which runs from mid-June to August.

The successive low yields are supported by data from SODEXAM. As early as 2020, SODEXAM forecasted below-average rainfall in northern Côte d'Ivoire between April and June **(SODEXAM, 2019a)** and warned of irregular rainfall patterns in August 2020 **(SODEXAM, 2019b)**, predicting a 25% water deficit compared to the historical average. Added to this are poor agricultural practices, often aggravated by misallocation of maize-specific inputs toward other crops, especially market gardening.

The economic results show that maize production is actually a loss-making activity for the producers. When accounting for both actual and estimated production costs, it becomes evident that farmers are incurring deficits rather than profits—even for those who are project beneficiaries. This situation may stem from excessively high production costs, largely due to expensive inputs and still-insufficient yields.

These results confirm the findings of **Yéo (2021**), who argued that traditional farming methods render maize cultivation unprofitable, and that improving yields and market prices is essential for profitability. However, the findings of this study contradict **Akanvou's (1995)** position, which blamed the lack of subsidies for cereals for prompting the diversion of inputs initially intended for cotton toward maize. Subtly, maize inputs are also being redirected for other purposes, especially for vegetable production. Fundamentally, the solution may not lie in intensification, but rather in improving the maize value chain, allowing farmers to capture more added value.

Despite the economic unprofitability of maize cultivation, farmers continue to grow it, rather than abandoning it. This attachment can be explained by the fact that maize is mainly grown for household consumption, rather than as a cash crop. As a result, farmers may not feel the impact of financial losses as acutely. This observation is supported by **RONGEAD (2014)**, whose annual report noted that most maize produced in Côte d'Ivoire is cultivated on small plots (less than 2 hectares) and primarily for self-consumption. Another possible explanation is that farmers may not have actually allocated all the inputs received to maize cultivation as reported in the surveys. They may have simply declared what they were given, without applying it systematically. This could explain why they face high production costs and low yields.

Conclusion

This study reveals that agricultural credit for maize cultivation in the department of Odienné, granted primarily to producers with little or no formal education, most of whom are aged between 36 and 45 years, was used to develop an average area of 1.6 hectares, with a coefficient of variation of 56%.

Among credit beneficiaries, cultivated areas initially increased by approximately 0.3 ha from 2019 to 2020, but then decreased by an average of 0.6 ha from 2020 to 2021. Productivity in this group slightly declined from $1{,}067 \pm 844$ kg/ha in 2019 to $1{,}022 \pm 518$ kg/ha in 2020, followed by an increase to $1{,}311 \pm 1{,}068$ kg/ha in 2021. The coefficient of variation for yield reached 81% in 2021, alongside dropouts among the 2020 beneficiaries.

However, no statistically significant differences were observed between yields across the three years (2019, 2020, and 2021).

Overall, the input credit project is not profitable, whether under manual or animal-drawn cultivation, and regardless of medium or large farm size, even when only actual costs are considered. The inclusion of estimated costs for production factors not directly paid for further deepens the deficit across all farms. The break-even prices are generally 2.5 to 5 times higher than the prices offered to farmers.

Despite these significant deficits, farmers remain attached to maize cultivation because it is grown primarily for household consumption, not as a cash crop. Sociologically, maize represents a guarantee of food security for rural households and serves as a symbol of social integration during community events.

Acknowledgment:

Sincere thanks to the officials of the Union of Cooperative Societies of Côte d'Ivoire (UFACOCI COOP CA) for making this study possible.

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