Economic performance and GHG emissions of traditional and organic cocoa farms in the Peruvian Amazon

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INTRODUCTION

Organic certification for export commodities has been promoted as a promising mechanism for sustainable rural development in southern countries. While positive impacts have been documented , various studies raise questions on its overall effect on household income and welfare (Blackman & Riviera, 2010; Bray & Neilson, 2017). In the Peruvian Amazon, cocoa has been widely promoted as a coca substitution crop, with rapid increases in production, area and exports during the last decade (Charry et al., 2020). Currently, both conventional and organic production systems coexist in the region, and while various entities promote certified sustainable management practices to improve forest conservation, living conditions and reduce GHG emissions, various actors informed this project to have abandoned or avoided certification programs due to not being able to compensate the cost of additional labor and management requirements.

OBJECTIVE

Assess the profitability and carbon footprint of cocoa production under traditional (low input) and organic productive systems in the Amazonian region of Ucayali, Peru.

METHODOLOGIES

We used a Typical Farm Approach, combining participatory farmer workshops and expert consultation to define farms' typologies and obtaining a detailed quantification of all activities, processes, input and output flows of both production systems. Using this information, we developed discounted cash flow models for each typology and assessed their carbon footprint using the ISO 14067:2013 and PAS 2050:2011 standards. Finally, we evaluated different scenarios to assess their performance and potential economic and environmental tradeoffs.

RESULTS

TYPICAL TRADITIONAL FARM	TYPICAL ORGANIC FARM (low inputs/average yield)
Family agriculture, minimum to not input use	Family agriculture, organic certified with low incorporation of organic fertilizer
< 5 hectares	< = 3 hectares
Crop age: 3–7 < years	Crop age: 3–7 < years
Varieties: Mainly CCN51	Varieties: CCN51 + other varieties
Yield: 700 kg/ha	Yield: 800 kg/ha
Dry bean marketing	Dry and wet bean marketing
Previous land use: Coca, primary or secondary forests	Previous land use: Coca, primary or secondary forests
Beneficiaries of development programs	Beneficiaries of development programs
	8–12 US cents price differential per Kg

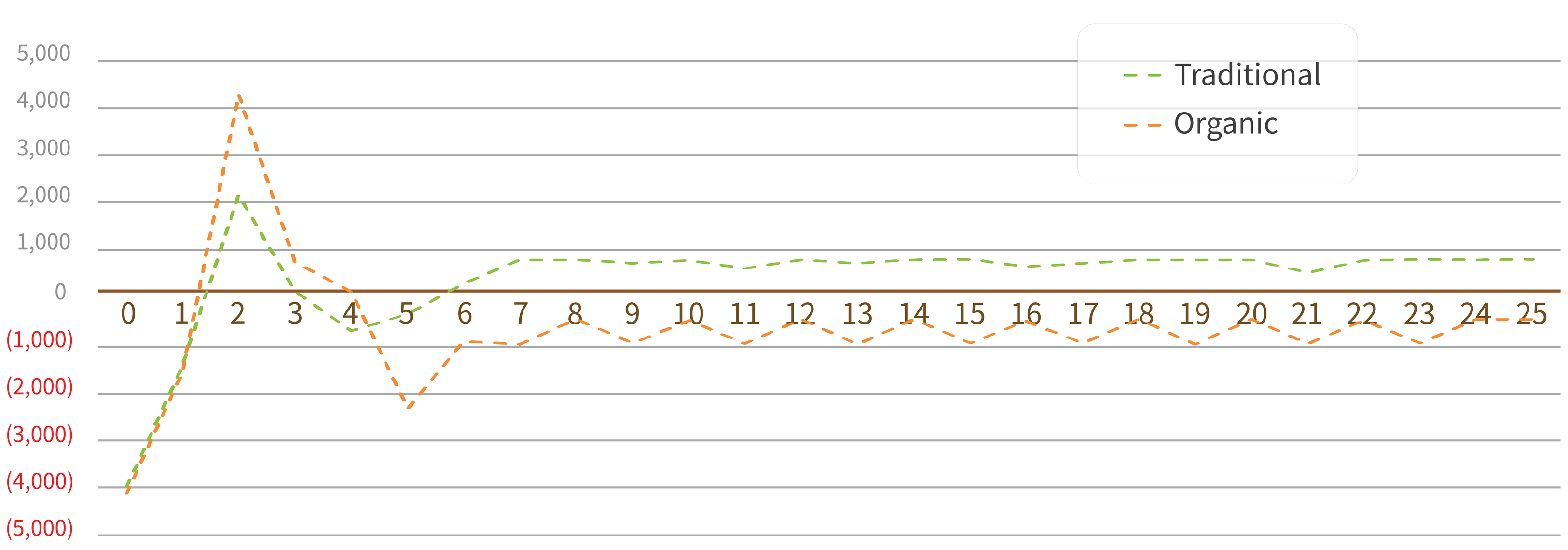
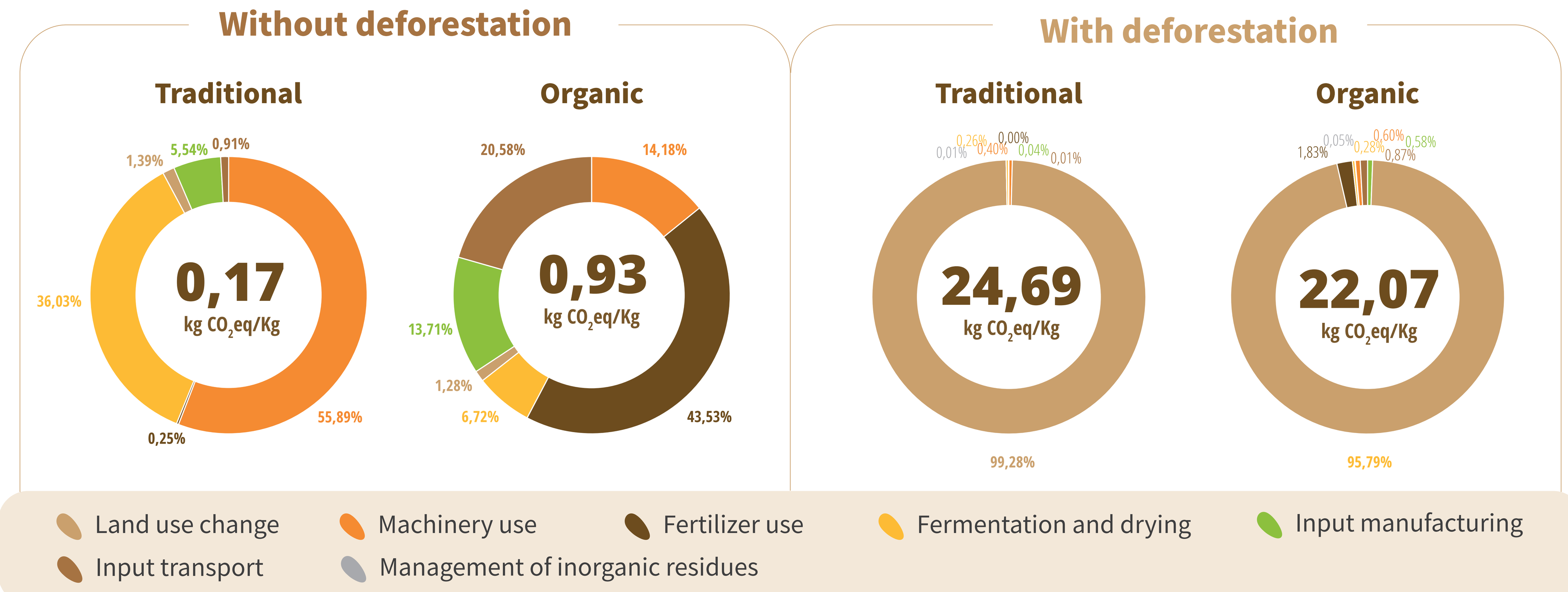


Figure 1. Yearly cashflow of typical farms (in PER Sol)

FINANCIAL INDICATORS	TRADITIONAL		ORGANIC	
	*Credit	No credit	*Credit	No credit
NPV (USD)	(812)	(504)	(3015)	(2454)
IRR	4.0%	6.4%	NN	NN
B/C ratio	0.93	0.96	0.82	0.84
Repayment period (years)	17	14	NN	NN

*Including financial cost of working capital at local interest rate

CARBON FOOTPRINT



INDICATORS	WITHOUT DEFORESTATION		WITH DEFORESTATION	
	Traditional	Organic	Traditional	Organic
KG CO2eq / Ha	119	744	17,283	17,656
Offset* (USD)/ Ha	1.8	11.2	259.2	264.8
Offset (USD)/ Kg	0	0.01	0.37	0.33
Profit (USD) / Ha	249	-232	249	-232
Profit - offset (USD)	247.6	-242.7	-0.9	-496.4

*The carbon price used for offsetting is 15 USD/Ton CO2eq, the average carbon price at Goldstandard®

DISCUSSION AND CONCLUSIONS

1. Two organic production models were identified in Ucayali, one characterized by inclusive business models, higher price differentials (fair trade + organic price premiums) and high yields (>1.000 kg/ha), which appears to be promising. Nevertheless, this analysis presents the most common model in the region, which appears economically unfeasible. Organic production should be promoted only if is accompanied with a technological package that allows sustainable intensification through sufficient yields and proper price differentials. Otherwise, traditional/no input production would seem to outperform it, both financially and in terms of GHG emissions.
2. Financial performance of the two analyzed typologies is considerably low, indicating vulnerability risks among the sector. At the same time, the results indicate factors that can be incentivizing farmers with access to capital to engage in other more profitable activities (e.g. rice), adding pressure on the forests.
3. 99% of the emissions in both models can be attributed to deforestation, making it the priority for mitigation efforts in the sector. There is no reliable information available to determine the extent of forest cover lost due to cocoa production and estimate total sector footprint.
4. True cost of production in deforested land, including offsetting emissions, would increase prices per Kg at nearly USD 0.35, three times the market price differential for organic production. Incentives for zero deforestation products should incorporate equivalent price premiums or compensations.

Limitations of the results: Self-reported yields and differences between organic fertilization vs no fertilization are low, which raises questions on the validity of the model conclusions. This can be a result of self report bias or due to other exogenous variables (differences in of soil and weather, cocoa varieties prevalent among typologies, etc.). Nevertheless, we don't expect much variation since yield reports are within the ranges validated with experts, reported in literature and obtained from triangulation with other farmers, reflecting the perception of profitability expressed by local actors. Further validation of yields from organic production systems under more controlled environments is recommended.

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