More than chocolate: diversifying cocoa agroforests for higher profitability in Cameroon

By

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Introduction

- One of the main tree-based systems in the West and Central Africa region is the cocoa plantation (*Theobroma cacao Linn.*)
- However, cocoa prices on the world market have been fluctuating significantly and farmers have been actively searching to diversify this system for more sustained income generation

(Jagoret *et al.* 2008; Sonwa 2004; Hietet 2005; Todem 2005).

Introduction… Continues

Participatory tree domestication

implemented by the World Agroforestry Centre and partners, since 1996 aims at:

- increasing farmers' incomes
- enhancing their resilience

by cultivating indigenous trees and developing strategies for marketing the produce

(Tchoundjeu *et al.* 1998).

Introduction… Continues

Farmers have used tree domestication skills to **diversify** their **cocoa plantations** with **"domesticated" trees**.

However, the impact on their livelihoods has not yet been evaluated.

=> a study to determine the financial profitability of cocoa agroforests enriched with domesticated trees was carried out in 2009.

Objectives

Global Objective:

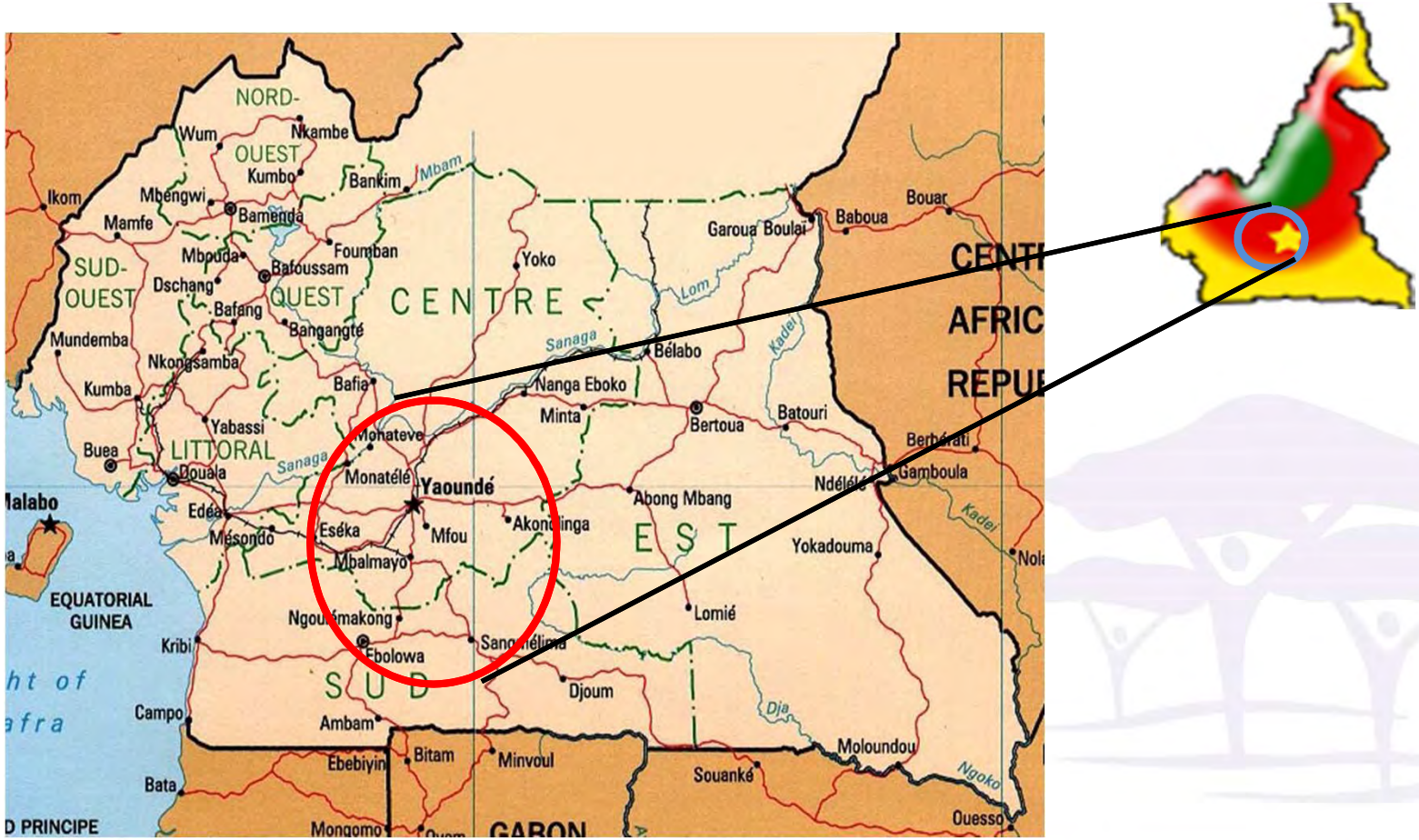
- to evaluate the **financial profitability** of cocoa agroforests

Specific Objectives:

- to estimate the profitability of traditional and enriched cocoa-based systems
- to determine the **optimal mix of trees that allows maximum** profitability in the most diversified cocoa-based agroforest
- to **simulate** the profitability of the most enriched agroforest in terms of number and types of domesticated trees integrated

Methodology: study site

- The Cocoa Production Basin of Centre Cameroon, because it is an area where cocoa yields are declining, thus needing strategies to increase productivity.



Methodology: tree species selection

Selection criteria:

- presence in the area
- market potential
- farmers' preference

- *Dacryodes edulis* (G. Don) H.J. Lam. (safou/plum)
- *Ricinodendron heudelotii* (Baill.) Pierre et P (njansang/African nut)
- *Irvingia gabonensis* (Baill.) (bush mango)

Methodology: data collection tools

- Interview with resource persons to determine yields, prices, etc.
- Ex-ante profitability analysis using enterprise budget; cost/benefit analysis; Net Present Value (NPV); Internal Rate of Return (IRR)
- Optimisation and Sensitivity Analysis using GAMS 21.3 (**G**eneral **A**lgebraic **M**odeling **S**ystem)

Table 1: Overview of 8 scenarios compared

Different systems compared

8 scenarios: different theoretical combinations of cocoa and “domesticated” tree species, following recommended densities (Table 1) in the different strata (Figure 1).

System	Species	Density	System	Species	Density
C	T. cacao	1111	C+S+M	T. cacao	1111
	D. edulis	0		D. edulis	35
	I. gabonensis	0		I. gabonensis	35
	R. heudelotii	0		R. heudelotii	0
C+S	T. cacao	1111	C+S+N	T. cacao	1111
	D. edulis	70		D. edulis	70
	I. gabonensis	0		I. gabonensis	0
	R. heudelotii	0		R. heudelotii	16
C+M	T. cacao	1111	C+M+N	T. cacao	1111
	D. edulis	0		D. edulis	0
	I. gabonensis	70		I. gabonensis	70
	R. heudelotii	0		R. heudelotii	16
C+N	T. cacao	111	C+S+M+N	T. cacao	1111
	D. edulis	0		D. edulis	35
	I. gabonensis	0		I. gabonensis	35
	R. heudelotii	16		R. heudelotii	16

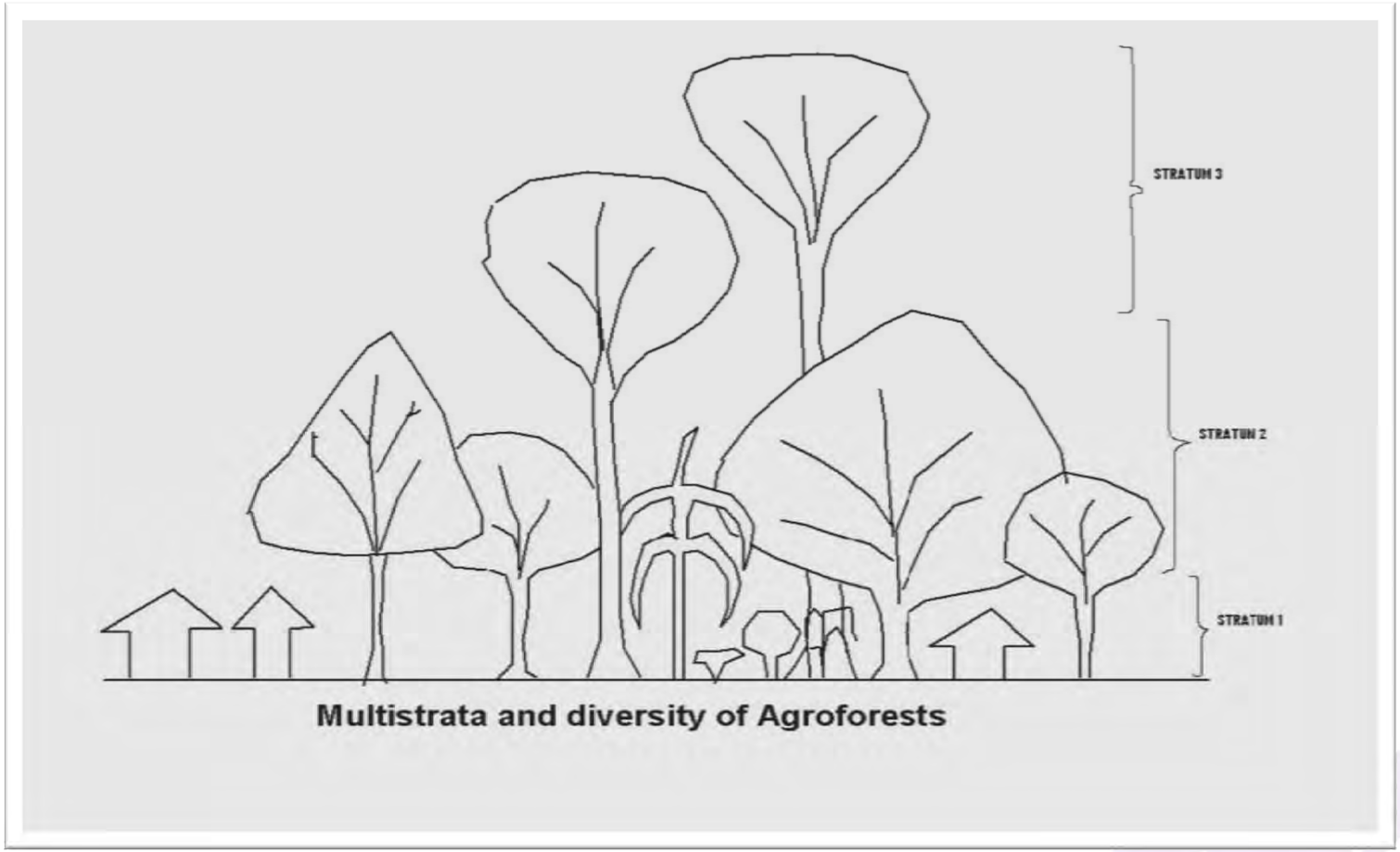


Figure 1: Different strata used to determine densities

Stratum 1 = cocoa (3m x 3m);

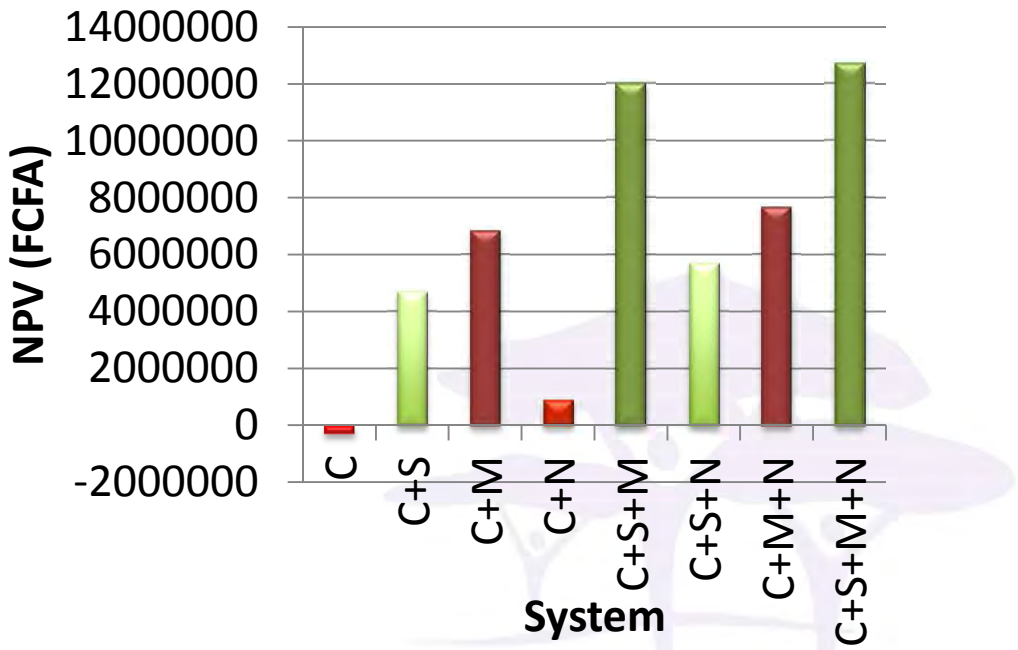
Stratum 2 = safou +mango (12m x 12m);

Stratum 3 = njansang (17m x 17m) Source: Mbile *et al.* (2007)

Results…1

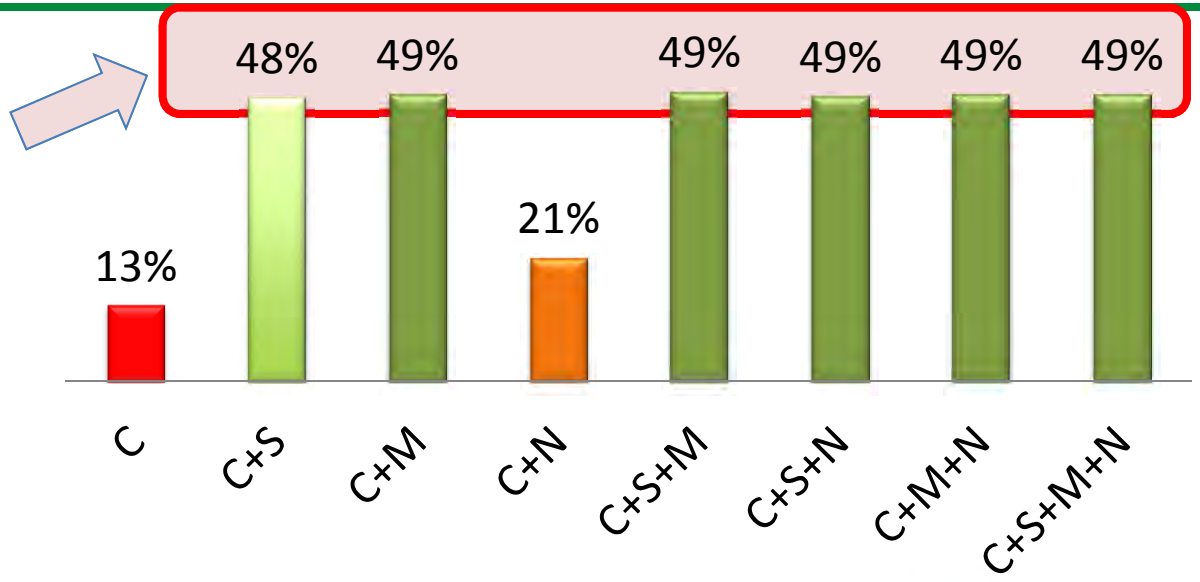
- Traditional system (C) was not profitable and only the enriched systems had an acceptable NPV (Fig 2).
- The different systems did not have the same level of profitability.
- The most diverse system (C+S+M+N) had the highest NPV.

Figure 2: Net Present Value



Results…2

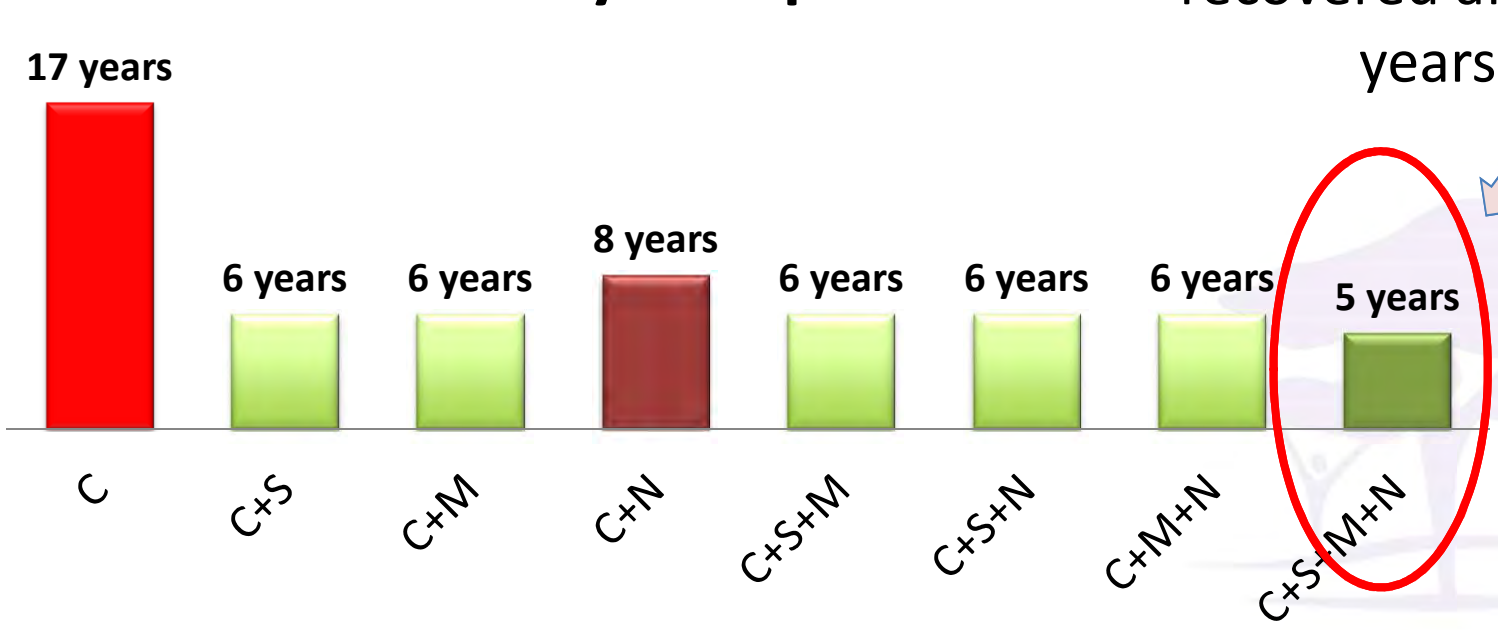
Figure 3: Internal Rate of Return (IRR)



- Apart from cocoa only (C) and cocoa and njansang (C+N), all systems had Internal Rates of Return values close to **49%**, so were profitable (Fig 3).

Results…3

Use of the payback period propelled the "**C+S+M+N**" in the first position since capital invested in this agroforest was recovered after **five** years.



Results…6

The optimal use of resources in this agroforest showed that:

- **713 cocoa**
- **35 safou**
- **42 bush mango**
- **10 njansang** trees

are sufficient to obtain a maximum profit of 3,082,171 FCFA (**6850 USD**) per year and per hectare.

Conclusion

Under the current circumstances in the Centre region of Cameroon:

- **Cocoa-based agroforests are only profitable when other tree species are associated**.
- The most diverse system (cocoa+plums+bush mango+njansang) is the most interesting combination and allows an efficient use of resources according to the GAMS analysis.

Policy implications

- Governments are encouraging new establishment, regeneration and extension of cocoa farms.
- It is recommended that such initiatives include mechanisms to support cocoa producers to diversify their cocoa farms with locally important and economically interesting Neglected and Underutilised Species with an aim of providing food, medicines, spices, etc. for home consumption and sales, for increased income and more stability when cocoa prices are fluctuating.

Ways Forward

- Results are based on theoretic systems using simulation models. However, there is a need to test these results on-farm and do similar studies with other species to determine their profitability as well.

- Already an on-farm trial on cocoa-based agroforest where cocoa is associated with domesticated local trees was established in Ngali 2, a village near Yaoundé, 2009.

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Thank you for your attention

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