The “bean tegument” innovation system: bringing back to smallholders’ cocoa farms the fertility lost or transferred to agro-industry

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When they sell their beans to a grinding company, growers give up a source of organic fertilizer: the tegument (the skin of the bean).

It is even used and valorised as organic fertilizer in the gardens of European citizens

The vast majority of growers are still unaware of this value

Similarly, for the grindings multinationals, the teguments have long been considered bulky waste in the parks of the factories which had to be rid of. Part of it was recently sold to industrial sweet banana plantations.

But at least in the San Pedro region, since the early 2010s, a whole network of smallholders, cocoa traders and intermediate staff in cocoa grinding factories had gradually realized the interest of teguments as fertilizers in cocoa farms. A few smallholders’ testimonies were collected around San Pedro as part of a research program on innovation tracking.

Then in order to verify the claim, we launched a survey based on a questionnaire passed with some 80 smallholders in two villages. Cleary, a remarkable innovation system has been built from ‘below’. Quite informal channels have been set up to bring this tegument from the factories back to the cocoa farm plots, often going through a burning stage.

Smallholders call this form of tegument ash “potasse” Smallholders who have tested it, mainly in the form of burnt tegument, announce yield gains of 50% for 2 years after application. In the village studied near San Pedro, the rate of adoption of this “new fertilizer” increased from 0 to 70% of planters in 5 years.

Table 1. Annual yields per hectare before and after application of 50 bags of ‘potash’ on 30-year-old plantations

	Before (kg/ha)	After (kg/ha)	Gain (kg/ha)	Gain (%)
Mean	531	1,131	600	113%
Median	550	1,134	630	115%
Standard deviation	183	387	254	

Sources: authors’ surveys 2019

In terms of income, a quick calculation gives net gains of over 300,000 and a gain/cost ratio between 3 and 4, more than enough to reduce the risks of the investment.

Table 2. Average gross and net incomes (without labour) for an average yield of 600 kg/ha on 30-yearl-old plantations

	Years	2018	2019
(a)	Cocoa price (FCFA/kg)	750	825
(b)	Price of a 25 kg potash bag (FCFA/kg)	2,500	3,000
	Hypothesis in yield gain (kg/ha)	+600	
(r)	Income gross gain per hectare (FCFA/ha)	450,000	495,000
(p)	Cost of 50 bags of potash (FCFA/ha)	125,000	150,000
(r/p)	Gain in net income (FCFA/ha)	325,000	345,000
(r/p)	Ratio gain/cost	3.6	3.3

The idea is this to convince the grinding giants to fill their trucks with the dose of teguments in proportion to the tonnage of beans received, around 7-10%. For a load of 30 tons of beans, the truck would leave with at least 2100 kg of tegument. Two cooperatives (actually ‘pisteurs’ who have renamed their private business as a cooperative) have started to take into account the demand of smallholders and sell them bags of "potasse", produced by intermediaries.

The grinding industry doesn't seem to know... But if the grinding and chocolate industry were to become an active partner in this system of innovation, if the industry really wanted to play the "sustainability" game, the potential beneficiary smallholders would number in tens of thousands of villagers.

In the context of the war in Europe and the inflation exerted in particular on fertilizers, those who govern the cocoa value chain could reconsider the interest of this village innovation.