



Improving rubber tree productivity by reducing tapping frequencies in Guatemala

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Abstract *Hevea brasiliensis* is a perennial crop that can be exploited in 30 to 40 years cycles. Its particular system of harvesting, tapping, consists in removing a thin layer of bark (1.5 to 2.0 mm in depth), so that the latex can be expelled. This operation is repeated at regular intervals of 1 to 5 days. The choice of interval determines the tapping frequency.

The improvement of productivity and profitability can be achieved either by increasing the yield per tree or by reducing the labor required. Productivity per tree depends on the genetic potential, its behavior in a given environment and its reaction to the tapping frequency. For the tapper, productivity depends on the number of trees tapped per round and on the quantity of latex the tree will produce as a result of each tapping operation. This quantity of latex can differ with the tapping frequency.

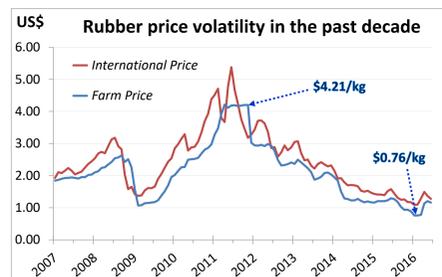
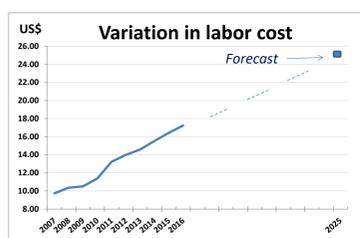
A study was conducted in Guatemala on the effect of reducing the tapping frequencies from every 3 to 7 days, combined with the use of a stimulant (Ethepon, 2.5% a.i.) with applications frequencies ranging from 8 to 14 applications a year.

Our results showed that the yield per tree per year ($g \cdot t^{-1} \cdot y^{-1}$) decreased with a decrease in tapping frequency whereas the yield per tree per tapping ($g \cdot t^{-1} \cdot t^{-1}$) increased with a decrease in tapping frequency. The economic impact of the reduction in tapping frequency is presented with different possible prices of rubber.

1 – Economic Context

Constraints:

- Rubber price volatility (from US\$0.76 to US\$4.21, average = US\$2.10)



- Continuous increase of labor costs (current = US\$17; forecast 2026 = US\$25.00)

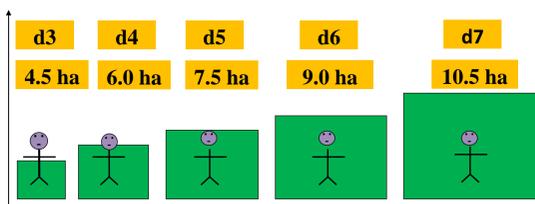
Statement:

- The current tapping frequency system “d3” is not profitable.

2 – Technical definitions

- Tapper’s productivity = N° of trees tapped (per round) × yield /tree /day (g/tree/tap)
- Land productivity = N° of trees tapped (total of farm) × yield /tree /year (kg/tree/year)
- Tapping task: N° of trees tapped /day (standard = 600 trees/day).
- Tapping frequency: N° of days between two tapping tasks (current= 3 days “d3”).

In d3: a worker can tap 600 trees × 3 tasks = 1800 trees per round (equivalent to 4.5 ha)



3 – Objective of the study

To increase the tapper’s productivity by reducing the tapping frequency

i.e. increase the tapping frequency (N° of days per round) from d3 to d7, so the tapper can tap 4,200 trees per round instead of 1,800.

4 – Materials and Methods

Practical example: Farm in Guatemala

Running costs of tapping rubber trees include:

- Tappers’ costs,
- Tappers’ supervisor’ costs,
- Stimulant and its application,
- Phytosanitary treatments of tapping panel,
- Tapping tools.

Typical Guatemalan farm	
Ha / Farm	45
N° of trees tapped / ha	418
Kg / tree / year	4.7
Kg / ha	1,965
N° of trees / tapping task	600

Technical-economic simulations

Simulations were run for two parameters:

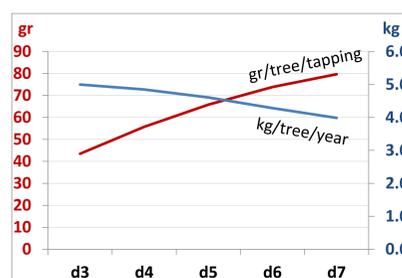
- Rubber price volatility: Min (US\$0.80) to Max (US\$2.10)
- Labor cost: Current (US\$17.00) to planned (US\$25.00)

5 – Results

Latex yield per tree

Consequences of decreasing the tapping frequency:

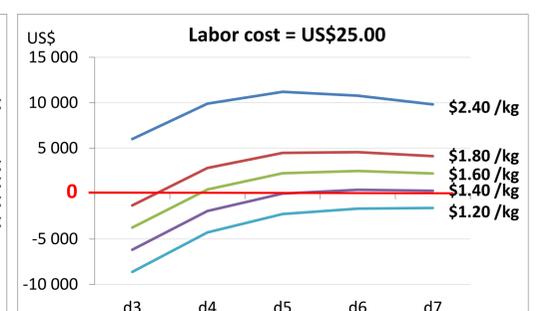
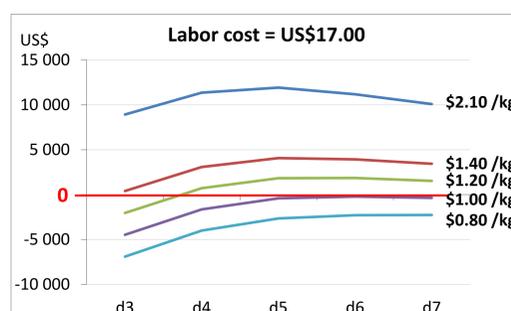
- Increase the yield per tree per round (g/tree/tap) with a specific number of stimulations for each frequency;
- Reduction in the yield per tree per year (kg/tree/year).
- Reduction in bark consumption.



Profitability

Comparison of the different tapping frequencies showed that:

- Under US\$1.00 /kg for a labor cost of US\$17 (or US\$1.35 /kg for a labor cost of US\$25), all tapping frequencies lead to economic loss.
- At US\$1.00 per kg for a labor cost of US\$17 (or US\$1.30 per kg for a labor cost of US\$25), the breakeven point is d5.
- At US\$1.20 per kg and above for a labor cost of US\$17 (or US\$1.60 per kg for a labor cost of US\$25), d5 is always the most profitable option.
- The d6 and d7 frequencies are less profitable, mainly because of the drop in yield per tree per year.



Net tapping profit as a function of rubber prices in Guatemala



6 – Discussion

When rubber prices are low, profitability is limited and there is no significant differences between d5, d6 or d7 tapping frequencies.

When rubber prices are high, the maximum net tapping profit is achieved for d5, and decreasing the tapping frequency to d6 or d7 reduces profitability.

As rubber farmers fix the tapping rate for the whole year, d5 allows better absorption of fluctuation in latex prices over the year than the currently used d3.

The number of stimulations needs to be adapted to each frequency regime to reach the maximum rubber tree potential.

The reduction in bark consumption increases the economic lifespan of the rubber trees.