

Agroforestry systems with cocoa and banana plantation in rubber tree areas to increase income, São Paulo State, Brazil

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INTRODUCTION

Cocoa (*Theobroma cacao* L.) a plant from Central America cultivated long before the arrival of the European settlers is very important in Brazilian agricultural scenario since Brazil is the fifth largest producer in the world and 90% of this production is directed to foreign market. After the decline of the crop in the 1980s a restructuring program led to a resumption of production increasing Brazilian production from 170,000 tons (2003) to 279,000 tons (2014).

The state of São Paulo produced 56% of the national rubber in 110,000 hectares cultivated with **rubber trees (*Hevea brasiliensis*)** and production of 98,000 tons of dry rubber in 2017. An project between CDRS (Coordenadoria Desenvolvimento Rural do Estado/ Coordination of Sustainable Rural Development) and CEPLAC (Executive Committee of the Cocoa culture planning) has directed plantations in the region of São José do Rio Preto, São Paulo State.

MATERIAL AND METHODS

Plantation in full sun in a consortium with banana and windbreaker of rubber tree. Banana plants protect the new cocoa plants by shading them as they are planted in the sun's line. An artificial cover is also placed to avoid direct sunlight in the cocoa plant during the first months.

The experimental areas with cocoa clones from CEPLAC, were planted in rubber tree plantations, with different spacing (2.5m x 8m and 14m x 3m).

In this area a line of rubber trees was ripped out to allow cocoa plantation between lines.



The cocoa cultivation areas have increased in northwest of São Paulo state in consortium with **rubber tree (*Hevea brasiliensis*)** in agroforestry systems due to dissatisfaction with rubber tree latex price as a possibility of an extra income in the same area.



Cocoa plantation intercropped with banana in fullsun and rubber tree as windbreaker.

Costs of plantation- time to explore-yield:

Rubber tree plantation (476 plants / ha) = US\$ 5.250 *Years to explore* = 7 to 8 years
Yield/income: 1.6 tons of latex or US\$ 340/ ha/year.

Irrigated agroforestry system with rubber tree, cacao and banana (397 rubber plants in the first year, 855 second year banana plants and 855 cocoa plants in the third year) = US\$ 7,950.
Years to explore= 3 years (banana) *Income*: US\$ 1860/ ha/year

CONCLUSIONS

- Agroforestry system with cocoa, banana and rubber tree can give extra and earlier income to rubber trees farmers in new plantations.
- Cocoa plants can be planted between rubber trees lines in old plantations areas in order to increase economic and sustainability gains.
- Cocoa expansion attracted interest of industries that process and commercialize cocoa and its products demanding new local technical and political strategies.

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