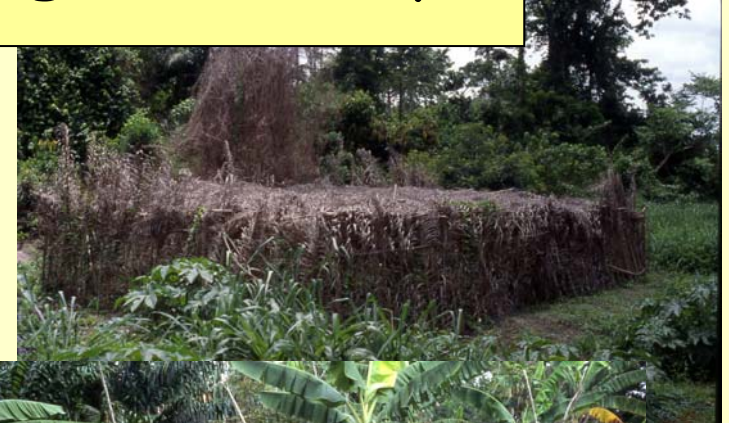




# Intensification and Agroforestry

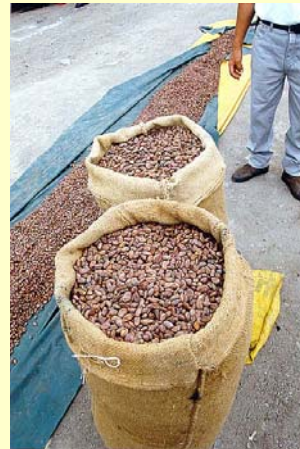
What  
solution  
for  
cacao  
systems  
?



# Intensification for cocoa systems today

Intensification ... or how to produce more and faster on the same piece of land...

A - To increase ... the quantity of product generated by a plot planted with cocoa



B - To accelerate ... the process between plot creation and harvesting





## Intensification for cocoa systems today

Increasing quantity...and accelerating the process...

...for cacao  
(Standard Agronomic research)

- 1- Genetic improvement and propagation techniques
- 2- Planting techniques : density management
- 3- Shade management : temporary and permanent
- 4- Plot management : weeding, fertilizing, pruning and replacing techniques
- 5- Pest and diseases control techniques
- 6- Harvesting and post harvesting techniques

...for cacao and associated crops  
(Farmers and, recently,  
Agroforestry research)



# Intensification for cocoa crop today

*(Standard agronomic research)*

## 1- Genetic improvement and propagation techniques

Diseases resistant breeds (A)  
High yielding breeds (A)  
Early producing breeds (B)  
Specific quality breeds (C ?)

BY

Sexual propagation (B):  
Pods (from manual pollination in seed production plots)  
Clonal propagation (B):  
Grafting  
Cutting  
Vitro-plants from embryogenesis or micro-cuttings

# Intensification for cocoa crop today

*(Standard situation today)*



# Intensification for cocoa crop today

*(Standard agronomic research / farmers' practices)*

## 2- Planting techniques

Density recommendations and possible adjustments  
(A & B)

Clearing and replacements : A

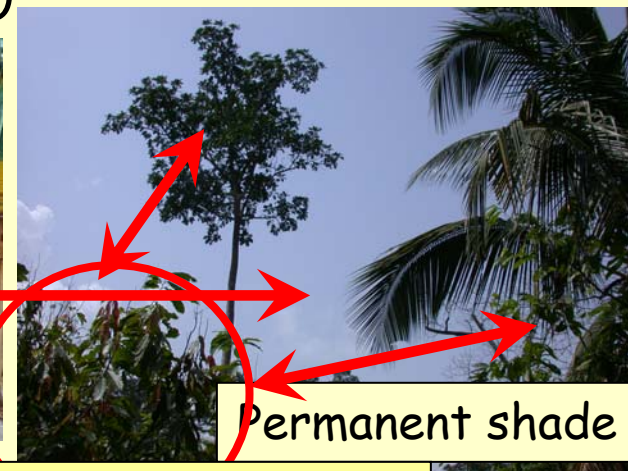




# Intensification for cocoa crop today

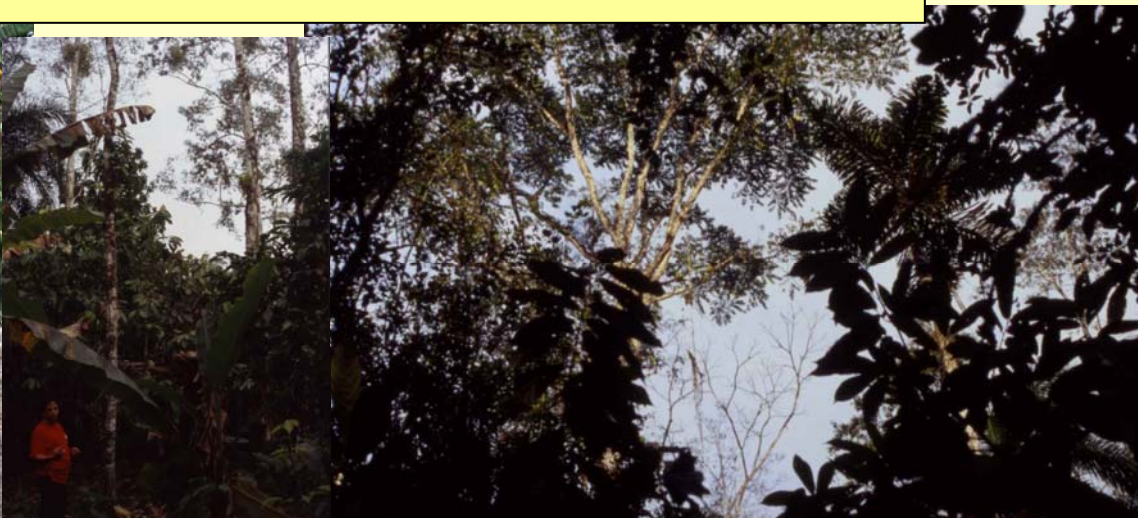
*(Standard agronomic research)*

## 3- Shade management (A & B)



# Intensification for cocoa crop today

*(Standard situation today)*



# Intensification for cocoa crop today

*(Standard agronomic research/farmers' practices)*

## 4- Plot management techniques



**Pollution**

**Fertilizing**

**Weeding**

**No Pollution  
But pain...**





# Intensification for cocoa crop today

*(Standard agronomic research)*

## 4- Plot management techniques

Pruning...to give a shape making harvesting easier

Pruning...to lower size or diseases incidence

Pruning...to maintain shape AND size

Pruning...to stimulate flowering





# Intensification for cocoa crop today

*(Standard agronomic research / farmers' practices)*

## 4- Plot management techniques



# Intensification for cocoa crop today

(Standard agronomic research / farmers' practices)

## 5- Pest and disease control techniques

### CHEMICAL CONTROL

Spraying against capsids (Africa)

### BIOLOGICAL CONTROL

Sanitary harvest

Trichoderma and Crinipellis (Brazil)



### MANUAL CONTROL

Stem borers (Africa)

Pod borers (Asia)

*Moniliophthora roreri*  
and *Phytophthora* sp.

(America and Africa)



NO CONTROL or WORSE...

Spraying against capsids (Africa)

# Intensification for cocoa crop today

*(Standard agronomic research / farmers' practices)*

## 6- Harvesting and post harvesting techniques





# Intensification for cocoa crop today

*(Standard agronomic research)*

## 6- Harvesting and post harvesting techniques

Fermentation



Drying





## Intensification for cocoa agroforestry cropping systems ?

More than 50 years of investigations and a huge amount of knowledge about THE COCOA PLANT and PURE COCOA CROPPING SYSTEMS

BUT

Very few of these systems are found in cocoa farms throughout the world  
Only recently researches have been conducted on cocoa cropping systems including timber and fruit trees

These systems have always had advantages for farmers in terms of :

- low economical risk regarding market prices,
- food security for the family,
- savings in the form of timber that can be felled and sold,

AND THEY PROVIDE ENVIRONMENTAL SERVICES :

- Higher wildlife biodiversity (forest-like ecosystems)
- Higher « C-sequestration »
- Lower pollution because they are « low-input »



## Intensification for cocoa agroforestry cropping systems ?

### HOWEVER :

Little is know about interactions between cacao trees and others associated trees :

- In the soils : root competition for nutrients,
- Under the cocoa canopy : humidity level and diseases epidemiology
- Above the cocoa canopy : competition for light, pests hosted in shade/Timber/fruit trees

Little is known about the ecological rôle on biodiversity of cocoa-based agroforestry systems at the landscape level...

