Assessing rehabilitation efficiency of degraded cocoa (\textit{Theobroma cacao} L.) farms in Cote d’Ivoire

Christophe Kouame$^1$, Bene Yeboi$^1$, Mahias Tahi$^2$, Stephane Diomande$^1$, Jane Kahia$^1$, Jean-Claude N’zi$^3$ and Lucien Diby$^1$

$^1$World Agroforestry Centre, Abidjan, Cote d’Ivoire
$^2$Centre National de Recherche Agronomique, Abidjan, Cote d’Ivoire
$^3$University Felix Houphouet Boigny, Abidjan, Cote d’Ivoire

2016 Next Generation Cocoa Research Symposium
Context

• Cocoa is a key driver for the socio-economic development in Cote d’Ivoire.
• However, cocoa production is facing enormous sustainability challenges.
• The majority of the farms are planted with non improved cultivars which have passed their peak productivity.
• Inadequate access to improved germplasm, depleted soil nutrient stock and Swollen shoot virus disease add more complexity to the challenges of declining farms’ productivity.
Objective

• To evaluate the agronomic and economic efficiency of cocoa rehabilitation technologies.
Materials and Methods

Location:
Nawa region (Soubré), Côte d’Ivoire
16 localities
Materials and Methods

Germplasm:

• 9 elite cocoa clones (C1, C8, C9, C14, C15, C16, C17, C20 and C21) were used as scions for side-grafting on mature trees

• A composite hybrid variety (*Mercedes*)
Materials and Methods

Four rehabilitation treatments and a control
• T1: Good crop management practices with no fertilizer
• T2: Good crop and soil management practices (GAP)
• T3: GAP + Grafting clones on mature rootstock
• T4: GAP + Total replantation with hybrid variety
• T0: Farmer practices
Materials and Methods

- Two-2000 m\(^2\) plots in farms aged over 20 years were rehabilitated per location

- The rehabilitation treatments were arranged in a split plot design with each location used as a repetition
Materials and Methods

Agronomic data

• pre-production (flowering intensity, flushes date)
• Production (Pod number, beans quality)
• Yield

Economic data

• Labor costs
• Input costs
• Income
Rejuvenating overaged cocoa farms

Results

An old and unproductive cocoa farm just grafted at Petit Bondoukou, Soubre

The farm 3 years after grafting (production starts about 9 months after grafting)

2016 Next Generation Cocoa Research Symposium

www.worldagroforestry.org
## Results

### Average yield (kg/ha) of cocoa rehabilitation technologies

<table>
<thead>
<tr>
<th>Treatment</th>
<th>2011-2012</th>
<th>2012-2013</th>
<th>2013-2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year 0</td>
<td>Year 1</td>
<td>Year 2</td>
</tr>
<tr>
<td>T0</td>
<td>202.2</td>
<td>278.7</td>
<td>655.4</td>
</tr>
<tr>
<td>T1</td>
<td>248.8</td>
<td>289.9</td>
<td>747.6</td>
</tr>
<tr>
<td>T2</td>
<td>228.8</td>
<td>503.7</td>
<td>1186.0</td>
</tr>
<tr>
<td>T3</td>
<td>11.8</td>
<td>448.4</td>
<td>1726.0</td>
</tr>
<tr>
<td>T4</td>
<td>0</td>
<td>17.8</td>
<td>110.3</td>
</tr>
</tbody>
</table>

T0 = Farmer practices  
T1 = Good Agricultural Practices (GAP) with no fertilizer  
T2 = GAP + fertilizer  
T3 = Grafted improved clones on mature trees + GAP + fertilizer  
T4 = Replantation with improved hybrid + GAP + fertilizer

2016 Next Generation Cocoa Research Symposium

www.worldagroforestry.org
Results

Average gross income per treatment (FCFA/ha)
## Results

Average financial net benefits per treatment (FCFA/ha)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>46,292</td>
<td>46,292</td>
<td>46,292</td>
<td>46,292</td>
</tr>
<tr>
<td>T2</td>
<td>-216,508</td>
<td>-203,656</td>
<td>532,940</td>
<td>1,416,620</td>
</tr>
<tr>
<td>T3</td>
<td>-651,016</td>
<td>24,664</td>
<td>1,376,980</td>
<td>2,564,740</td>
</tr>
<tr>
<td>T4</td>
<td>-638,130</td>
<td>-130,430</td>
<td>152,892</td>
<td>42,825</td>
</tr>
</tbody>
</table>

2016 Next Generation Cocoa Research Symposium
Conclusion

- Rehabilitating old cocoa farms using grafting improved clones, good crop and soil management practices lead to increase productivity and profitability.
Conclusion

- The rehabilitation of degraded cocoa farm however, remains context specific and require a thorough diagnostic to select the appropriate options.
THANK YOU