Structure of cocoa orchards and agroforests in West and Central Africa: A review

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Plan

- Expectation from cocoa farms
- Structure of cocoa in Cameroon
- Density (cocoa & Associated plants)
- Conclusion and way forward
What implications for cocoa research agenda?
Expectation from cocoa farms

West Africa had been deforested with the contribution of cocoa expansion.

The earth of the continent is still green (Ex. DRC), but may be the next frontier of agro-industries extension after west Africa.
Expectation from cocoa farms

- Sustainable cocoa production

- Ecological services (Formerly provided by forest)
  - Biodiversity conservation (inside cocoa and the cocoa/forest landscapes)
  - Carbon storage
  - Zero deforestation

- Diverse livelihood products (plants associated with cocoa)

CBD & UNFCCC
Expectation from cocoa

The Challenge Question

- What type of structural systems can help to fulfill the expectation placed on cocoa?
- What is the structure of the current cocoa agroforestry/orchard system?
- How to improve this system?
Table 1 Plant density of cocoa agroforests of Southern Cameroon (Plant ha$^{-1}$)

<table>
<thead>
<tr>
<th>Zone</th>
<th>Cocoa tree ha$^{-1}$</th>
<th>0-5m</th>
<th>5-10m</th>
<th>10-20m</th>
<th>&gt;20m</th>
<th>Tree ha$^{-1}$</th>
<th>Total Plant ha$^{-1}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ebolowa</td>
<td>1048</td>
<td>67 b</td>
<td>59 b</td>
<td>138 b</td>
<td>34 a</td>
<td>298</td>
<td>1346 b</td>
</tr>
<tr>
<td>Mbalmayo</td>
<td>1283</td>
<td>60 b</td>
<td>108 a</td>
<td>161 a</td>
<td>28 a</td>
<td>358</td>
<td>1641 a</td>
</tr>
<tr>
<td>Yaoundé</td>
<td>1173</td>
<td>142 a</td>
<td>64 b</td>
<td>89 b</td>
<td>13 b</td>
<td>308</td>
<td>1481ab</td>
</tr>
<tr>
<td>HFZ</td>
<td>1168</td>
<td>90</td>
<td>77</td>
<td>129</td>
<td>25</td>
<td>321</td>
<td>1489</td>
</tr>
<tr>
<td>P</td>
<td>0.20</td>
<td>0.00</td>
<td>0.02</td>
<td>0.00</td>
<td>0.00</td>
<td>0.33</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Associated plants constituted:
*22% density of cocoa agroforest
*85% of the cocoa agroforest basal area

Increasing land-use intensity at the landscape level tend to increase density of plant in the cocoa strata

Cocoa density

Advises and field realities

➤ ADVICE*

1000 to 2000 cocoa/ha

➤ FIELD OBSERVATION**

In Cameroon, 6% of trees did not produce any cocoa pod after one year of pesticide application. Removing pesticide application increase the number to 21% of trees

➤ FIELD OBSERVATION*

1028 to 2400 cocoa/ha (Cote d’Ivoire)

1000 to 2500 cocoa/ha (Ghana)

1000 to 1750 cocoa/ha (Nigeria)

Mains reason justifying cocoa density reduction/reconfiguration

- Slowing the spread *Phytophthora*
- Keep the production optimal
- Diversification of cocoa system
Associated plants density

Advice*

➤ 83 trees/Ha (ONADEF, Cameroon)

➤ 17 trees/Ha (Nigeria)

➤ 10 to 15 trees/Ha (Ghana)

Field Observation

Refer to Cameroon situation (More trees than advised)

*Sonwa et al (2008)

Few research had been carried on the density and stratification of plants associated with cocoa.
Conclusion

Products and services provided by cocoa depend on the management of cocoa and associated plants.

Horizontal and vertical structure play an important role in the magnitude of products and services coming from cocoa systems.

Structure of cocoa need to be an important indicator during cocoa system intensification, landscape restoration and expansion of cocoa farming in forest landscapes.

Multidisciplinary approach is necessarily to understand and manage the complexity related to structure of cocoa farms.
THINKING beyond the canopy

Thanks for your attention
Merci pour votre attention

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