Sustainable cocoa intensification for increasing cocoa productivity, quality and income

International Institute of Tropical Agriculture

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Intensification and climate-change resilience of cocoa production ((IITA)
Green Cocoa Business Service Centre (SNV)
Southwest region: Konye, Muyuka (KONAFCOOP, MAUCOOP) +3 in 2017
Center region: Ayos and Ngomedzap (COCOA+AYOS, SOCOPROCAON)
IITA Components

- Characterization of the cocoa production systems – baseline analysis
- Farmer training on good cocoa production and intensification (Farmer Field Schools).
- Promotion of mass plant multiplication of cocoa and associated crops and trees through establishment and maintenance of seed gardens, community-based plant multiplication centers, and promotion of tissue culture technology for cocoa multiplication.
- Rehabilitation and regeneration (replanting, grafting, and diversification).
- Mirid management (pheromone technology, biopesticide development, delivery system)
- Cocoa pollinators diversity and conservation.
- Impact of climate change on cocoa production and development and promotion of climate change adaptation and resilience practices.
- Soil fertility enhancement and impact on productivity through inorganic soil amendments.
- Succession planning and youth engagement in cocoa farming.
- Cocoa value chain analysis
Following presentation this morning by Maria Geitzenauer

- Household structure (age, gender) and size
- Income and expenditures, credit and capital
- Training, Farmer Field School, Certification
- Cocoa farm ownership – number, size, age.
- Cocoa farmer productivity and income
- Pest and disease rankings
- Input types and costs
- Shade use and climate change perception and adaptations
- Tree diversification and other crops
Total of 120 fields (30 in each site) were visited. Part of the data in poster presentation by Ewane et al.

Information obtained through the field interviews and visits:

- Field characteristics (size, age, previous land use, source of planting materials, other trees, etc.)
- Yield and input types (fertilizer, pesticides, herbicides)
- Labour input (by age, hired/own, gender)
- Direct assessment of pests and diseases
- Soil characteristics (texture, pH, carbon and essential nutrients)
- Shade and carbon stock (in wood, litter, soil, and roots).
- Diversification, other crops,
Diffusion of good agricultural practices

- Training of trainers (40; 10 in each locality).
- Target: 12000 producers

- FFS et FLG :
  - Integrated crop protection, good agricultural practices (harvesting and phytosanitation);
  - Occupational health and safety
  - Regeneration of cocoa plantation: planting, replanting and diversification.
Establishment of demonstration plots

Asare

- 40 plots (10 in Konye, 10 in Muyuka, 10 in Ngomedzap & 10 in Ayos)

Innovative diversification with plantains, cassava, and trees (fruit and timber trees)
Integration of seed gardens with centers of plant multiplication (CPM)

IRAD (Breeders seeds) → Seed gardens → CPM

Distribution of planting material to producers under the auspices of the collaborating cooperatives

CPM: Center for plant multiplication

Contribution of IITA

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Centers for Plant Multiplications (CPM)

- 12 centers of the multiplication of plantains, cocoa, fruit trees, leguminous trees and forest trees.
- Konye, Muyuka, Ayos and Ngomedzap
- Already operational
- Yearly production of ~40,000 cocoa seedlings, 24,000 plantains plantlets, and 8,000 fruit trees.
- Land provided by cooperatives
- Two young attendants per center; one supervisor per région
- Integrate women and youth
- Revenue generating activity
- Business plan under development.
Somatic embryogenesis for cocoa multiplication

Primary callus → Secondary callus → Embryo development → Multiplication

Flower parts

Nursery

Acclimatization

Rooting

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A member of CGIAR consortium

www.iita.org
Biopesticides for mirid control

Poster by Mahot et al.

• Biopesticides based on two entomopathogenic fungi selected;
• Presently testing different formulations and on individual pods in the field
• Whole field testing to begin next year;
• Already in touch with private sector for commercialization;
• Optimization of sex pheromone trapping and integration with biopesticide through development of auto-incolators

Test de confirmation avec Beauveria

Piege a capsid dans les cacaoyeres
Background and Rationale

- Insects pollinators provides essential ecological services
- Cocoa depends on outcrossing and insect mediated pollination to ensure for fruit set;
- Very little is known on pollinators in cocoa from Cameroon – nice study from Ghana (Adjalo & Oduro 2013)
- Studies have reported midges as main pollinators of cocoa although not exclusively

- Study the diversity of pollinators and effect of biopesticides are important for improving the cocoa yield, for conservation purposes and enrichment of the literature
- The knowledge on the effect of biopesticides on cocoa pollinators is neglected
Traditional

Diversified with fruit trees

Full sun
Resilience and climate change adaptation

- 27 plots
- 9 in each of three locations across climate gradient with different levels shading
- Quantifying shades through tree/canopy measurements, fish-eye method, and drones
- Soil fertility enhancement (NPK, Mg, Ca)
- Soil water and plant water relations.
- Data collected on phenology, pest/disease/yield/quality
- Rainfall, relative humidity, temperature; soil and plant water status

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### Climate change and system tradeoffs

![Diagram showing climate change and system tradeoffs](image)

<table>
<thead>
<tr>
<th>Plot level functions</th>
<th>Full sun monocrop</th>
<th>Shade tree monocrop</th>
<th>Banana/food intercrop</th>
<th>Polyculture system</th>
<th>Forest system</th>
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*light color = low → dark color = high*

Source: vanAsten et al.
Youths’ engagement in sustainable cocoa production: Intergenerational knowledge transfer for sustainable cocoa farming

Poster by Nkengla et al.

A guide for succession planning is under review
Value chain analysis

Source: Maria Geitzenauer
The 6 innovations of the CBSC

**Solar Dryer**
(150m², 1.3 tons in 5 days: 40 tons per season)
No smoky cocoa, 100% grade 1 & ZERO Deforestation

**Processing Unit**
(From traditional and individual to modern technics by cooperatives added value-employment-income generation)

**Green Warehouse**
(Storage area: 160m², Storage Capacity: ~190 tons. Beans grown with IITA technics, and traced-> Certification)

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The 6 innovations of the CBSC

Inclusive Business Model for access to market
(Cocoa Producers, Buyers, Input Suppliers & Banks come to a win-win partnership)

Sweet Data Base
(Dynamic and computerized tool for cooperatives management)

Leadership & Nutrition
(Increase number of women in leadership positions & Youth involved in Cocoa farming)
Thank you
Hypothesis of Green Innovation Approach in CAM

L’ accès aux innovations

Small scale farmers do not have access to innovations due to organisational, financial or technical limitations or traditional practices and are unable to deliver to high segment markets due to low productivity, quality and organisational capacities.

Innovations

Définition : Innovation is the process of changing the existing routines in order to improve livelihoods or simplify the live.
Intervention areas

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Centres d’innovations vertes

Engagement du secteur privé (en amont et en aval) à travers les partenariats public-privé

Engagement des acteurs publics et civils pour la diffusion des résultats

Fournisseurs

Coopératives/ Associations

Transformateurs

Consommateurs

Capitalisation des résultats de la recherche et de la vulgarisation

Renforcer les capacités des coopératives en services, commercialisation, logistiques et agronomie

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