

# **A CONCEPTUAL FRAMEWORK FOR RESEARCH AND TECHNOLOGY TRANSFER TO SUPPORT SUSTAINABLE TREE CROP DEVELOPMENT**

by

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## **Background Summary**

The participants at the Yaounde Roundtable in June 1999 concluded that research and technology transfer is a critical component of a regional Sustainable Tree Crops Program (STCP). Productivity enhancing and environmentally-friendly technology will be critical to both the supply of tree crop products and farmer incomes.

The primary tree crops targeted by STCP are cocoa, coffee and cashew. Additional tree crops may be considered within the context of diversification of cocoa, coffee or cashew production systems.

A regional program is required to enhance the synergies to be gained by working across institutions and countries to successfully develop sustainable tree crop production. Furthermore, an integrated and holistic approach is necessary to link developments in research, technology transfer, market systems, information systems, grower and business support services, and policy change.

## **Component Goal**

The goal of the Research and Technology Transfer Component is to improve the well-being of small holder farmers through the development and transfer of technologies for sustainable tree crops systems that increase productivity, generate income, and protect the environment.

## **Overall Component Objective**

Through multi-institutional partnerships and in collaboration with farmers, the program will provide farmers with the technology and skills required to:

- Maintain over the long term increased productivity of high quality tree crop products,
- Ensure product competitive in international markets,
- Derive economic benefit from the opportunity of liberalized markets, and
- Sustainably use the natural resource base and conserve biodiversity while increasing productivity.

## **Areas of Intervention**

The Research and Technology Transfer component will develop activities in seven areas:

1. Diagnosis of constraints and opportunities and the impact of tree crop systems,
2. Germplasm improvement and multiplication,

3. Integrated pest and disease management,
4. Rehabilitation of existing tree crop plantations,
5. Establishment of tree crops in deforested land (new plantings),
6. Information and knowledge sharing, and
7. Technology transfer.

## **1. Diagnosis/Impact**

Purpose: Identify opportunities and examine links between production practices, environmental impact, and profitability under varying farmer circumstances.

Activity groupings:

- Elicit and evaluate local agronomic and ecological knowledge in complex agroforests using knowledge-based systems.
- Delineate and characterize farmer resource domains to target interventions (link to EPHTA).
- Develop economic models to evaluate intervention options for different domains.
- Characterize the environmental implications of different small holder tree crop management systems using a set of key indicators (link to ASB program).
- Provide information and guidance for the establishment, rehabilitation and management of environmentally sustainable tree crop systems under varying farmer circumstances.
- Train national researchers in knowledge-based systems, methods of domain delineation, economic modeling and environmental indicators.

## **2. Germplasm**

Purpose: Introduce, evaluate and multiply germplasm with associated phytosanitary issues and quarantine regulations targeted to specific farmer circumstances.

Activity groupings:

- Survey currently available germplasm resources by species and location, set up organized databases for species of interest with currently available information and define traits (and criteria) required for each species based on production, protection, processing and marketing.
- Establish regional trial framework to provide comparative trials of existing material of each species to allow discrimination between potentially exploitable genotypes/cultivars in various geographic areas and management systems.
- Establish appropriate protocols and inter-country agreements on phytosanitary requirements for germplasm exchange and the sharing and exchange of intellectual property and improved germplasm.
- Establish appropriate multiplication protocols to allow for rapid and secure extension of selected/improved material to farmers.
- Develop new varieties addressing major production constraints in the medium-term.
- Develop new breeding tools for future screening and genetic transformation as required to overcome production constraints that are difficult to overcome with existing methods.
- Train national partners in basic trial techniques, including experimental design and statistical analyses, multiplication methodologies and breeding tools.

## **3. Integrated Pest Management**

Purpose: Develop an integrated approach to pest and disease management based on cultural practices, biological control and judicious use of pesticides.

Activity groupings:

- Isolate, test and establish pilot production of an entomopathogenic biopesticide for the control of major insect pests.
- Isolate, test and establish pilot production of biocontrol agents for the control of major diseases.
- Develop mechanisms to allow for regional private enterprises to produce and market biocontrol products successfully.
- Identify and test tree habitat management regimes that are acceptable to small holders and limit pest/disease damage.
- Recommend and test an integrated pest management approach that includes the use of biocontrol agents, habitat management and the judicious use of pesticides.
- Train national partners in biopesticide development methodologies.

#### **4. Rehabilitation**

Purpose: Develop appropriate techniques and approaches to rehabilitate existing small holder plantations to increase income, assure environmental stability and reduce deforestation.

Activity groupings:

- Develop tree crop management techniques (e.g., thinning, pruning, fertilizer use) to increase productivity of existing trees under various farmer circumstances.
- Integrate improved varieties into existing tree crop plantations.
- Integrate alternative tree crops to diversify existing tree crop plantations.
- Produce extension material.

#### **5. New Plantings**

Purpose: Introduce environmentally and economically sustainable systems to establish tree crops on deforested land.

Activity groupings:

- Develop management techniques to establish productive tree crops (primary and associated) on deforested land focusing on soil nutrients, weeds and pests and shade requirements.
- Test annual food cropping opportunities during the establishment phase of new plantings.
- Test together with farmers productive multi-purpose, multi-product tree crop systems for deforested land under various farmer circumstances.
- Produce extension material.

#### **6. Information**

Purpose: Develop sustainable mechanisms to supply information, share knowledge, and coordinate research efforts.

Activity groupings:

- Support researchers with current information about relevant work elsewhere.
- Set up knowledge networks to enable researchers to communicate with each other.
- Develop a virtual cocoa research center and information clearing house.

## **7. Technology Transfer**

Purpose: Develop farmer participatory training modules on integrated crop management

Activity groupings:

- Compile and evaluate existing information on integrated crop management techniques for different tree crops.
- Explore farmer practices relevant to integrated crop management.
- Formulate a farmer participatory training program and train staff.
- Establish farmer field schools on integrated management of tree crops.

### **Moving Forward**

The discussion in this session will have to identify the priorities, the gaps and the role of the STCP, while maintaining cross-component coherence and synergies. It is important that the program builds on exiting experiences and institutional strengths and develops the necessary capacity in the region for a sustained development of tree crop systems in Africa.