



International Coffee Organization  
Organización Internacional del Café  
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Organisation Internationale du Café

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### **Project proposal**

**Enhancing use of coffee germplasm –  
an African perspective (Angola, Cameroon,  
Côte d’Ivoire, Kenya, Madagascar,  
Tanzania and Uganda)**

### **Background**

1. The International Plant Genetic Resources Institute (IPGRI) together with the Interafrican Coffee Organization (IACO) have submitted an outline proposal for a project to enhance the use of coffee germplasm resources in Africa.
2. At the 40<sup>th</sup> IACO General Assembly held in Luanda in December 2000, seven countries, Angola, Cameroon, Côte d’Ivoire, Kenya, Madagascar, Tanzania and Uganda, have expressed their interest in participating in the project.
3. The objective of this project is to coordinate the evaluation of existing germplasm collections and to enhance coffee genetic resources conservation strategies in the region.

### **Action**

The Executive Board is requested to consider this project outline.

## I. PROJECT SUMMARY

The International Coffee Organization (ICO) hereby submits the following project proposal with its recommendation for financing through the Second Account of the Common Fund for Commodities (CFC). The proposal was approved by the Executive Board on ..... following the recommendation of the Executive Director of the International Coffee Organization.

- Project title:** Enhancing use of coffee germplasm - an African perspective
- Duration:** Five years
- Location:** Angola, Cameroon, Côte d'Ivoire, Kenya, Madagascar, Tanzania and Uganda
- Nature of the project:** Coffee quality improvement by the conservation of coffee genetic resources
- Brief description:** The aim of the project is to contribute to the improvement of the welfare of millions of coffee small holders by enhancing the production of quality coffee in Africa through conservation and use of available germplasm. The specific objectives are coordinating evaluation of existing germplasm collections and enhancing coffee genetic resources conservation strategies in the region. These objectives will be achieved through (i) application of standardized protocols in evaluation of germplasm collections and providing access to information and documentation, and (ii) implementation of reliable technologies that will enhance conservation of coffee genetic resources in the region.
- Estimated total cost:** US\$ 3,350,000
- Financing from the Fund:**
- Counterpart co-financing:**
- Project Executing Agency:** International Plant Genetic Resources (IPGRI)

**Supervisory body:** International Coffee Organization (ICO)

**Collaborating institutions :** FOFIFA (Madagascar); Tropical Pesticides Research Institute & National Tree Seed Centre (Tanzania); Coffee Research Foundation (Kenya); Centre National de Recherche Agronomique (CNRA, Côte d'Ivoire); Coffee Research Centre (Uganda); Institut de Recherche Agricole pour le Développement (Cameroun); Institut National du Café – INCA (Angola).

**Estimated starting date:** January 2002

## **II. Project background**

1. The genus *Coffea* is endemic to the continent of Africa and the main cultivated species of coffee beverage are *Coffea arabica* and *Coffea canephora*. While robusta coffee (*C. canephora*) grows best in warm humid climate, arabica coffee (*C. arabica*), being a highland plant, prefers cooler climate with moderate rainfall. This is the reason why coffee is confined to the tropical and subtropical regions of Latin America, Asia and Africa.

2. A large proportion of coffee plantations in Africa were planted before independence and most of the later plantations still contain the same old varieties and have since not been renewed. This continued reliance on outdated and often unproductive varieties in the face of widespread prevalence of pests and diseases such as coffee berry borer, coffee berry disease (CBD), Coffee rust, and more recently Fusarium wilt and others, has seriously undermined coffee production in Africa. Other reasons for loss of competitiveness is the quality of some robusta coffees, a problem that may worsen with increased market liberalization, not to mention poor plantation management and agronomic practices. There have also been marketing problems.

### **Coffee varieties and breeding strategies**

3. With the exception of Ethiopia, the genetic diversity in major arabica coffee growing areas of the world including Eastern Africa was for a long time extremely limited owing to the restricted nature of materials originally introduced and also because arabica coffee is predominantly self pollinating. The emphasis in initial selection programme was improved yield and quality coupled with good adaptation; disease resistance being given low priority. The lack of genetic variability in arabica coffee was later to prove a serious drawback with the advent of two diseases, coffee rust (*Hemileia vastatrix*), and coffee berry disease (CBD) (*Colletotrichum kahawae*). The former has worldwide distribution while the latter is still confined to the African continent. Coffee rust had the most profound effect of any coffee

disease known until then, when it wiped out entire arabica coffee plantations in Sri Lanka in 1968/69 and spread throughout South and South East Asia causing similar destruction (van der Graaff, 1986). Only the introduction of robusta coffee saved the coffee industry in this region. CBD on the other hand is probably the most destructive of coffee diseases, with losses of between 50% - 80% being reported in countries such as Kenya, Cameroon and Tanzania especially in excessively wet years and in the absence of control measures (van der Vossen, 1985; Bakala and Nyemb, 1999).

4. Robusta coffee plantations unlike arabica contained considerable genetic variability owing to its allogamous nature and the nature of materials that were used to establish early plantations in Uganda, Cote d'Ivoire and the Democratic Republic of Congo (DRC). Since then more locally available materials were used for further genetic improvement. The emergence of the major diseases in arabica coffee led to fundamental changes in breeding strategies with the main priority shifting to disease resistance; improved yield and quality however, remained important components of these programmes.

5. Given that many coffee producing countries are unable even to maintain long term breeding activities owing to financial and manpower restraints and that breeders often operate under very isolated conditions, the importance of regional and international collaboration cannot be overstated. Breeding programmes take 10-15 years to obtain elite varieties and release to farmers for production purposes.

6. The biotechnological advances being made clearly demonstrate the role that genetic improvement can play in addressing some of the basic problems of coffee, particularly poor yields in Africa. At the same time, such advances open up new avenues that can be exploited through coordinated collaborative effort to ensure continued, and more rapid, progress. This will no doubt help turn the declining trend in coffee growing in the region to long term sustained improvement in productivity and quality. Some of the issues that the present proposal will address include:

- a. Enhancements of genetic base of resistance to diseases that are already being addressed in current breeding programmes (CBD & coffee rust) by accumulating, as much as possible, different genes that condition resistance.
- b. Possibilities have to be explored of finding sources of resistance against other potentially explosive pathogens.
- c. Quality enhancement in the short term through selection within existing *C. canephora* population for example as in the case of Côte d'Ivoire and Uganda and in the long term by using sources from other *Coffea* species.

- d. Providing technical support to on-going or proposed breeding programme through enhanced breeding and selection strategies which can be best achieved through regional and international collaborative effort in screening and testing as well as providing access to information and materials.

### III. LOGICAL FRAMEWORK

**Project title:** Enhancing use of coffee germplasm – an African perspective

**Estimated Project Start Date:** January 2002

**Estimated Completion Date:** 2007

**Date of this summary:** November 2000

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p><b>GOAL:</b> Improve the welfare of coffee smallholders and economies of coffee dependent countries.</p>	<ol style="list-style-type: none"> <li>1. New improved varieties of coffee made available to coffee farmers.</li> <li>2. Increased export value of African coffee</li> <li>3. Increase contribution to the GDP of coffee dependent countries in Africa</li> </ol>	<ol style="list-style-type: none"> <li>1. Seeds/germplasm distribution records of National Coffee Research institutes.</li> <li>2. ICO &amp; FAO statistics</li> <li>3. Economic indicators reports of target countries.</li> </ol>	<ol style="list-style-type: none"> <li>1. Marketing policies are conducive for promotion of African coffee</li> <li>2. African coffee prices remain competitive on the world market</li> <li>3. International and regional consumption increases</li> </ol>
<p><b>PURPOSE:</b></p> <ol style="list-style-type: none"> <li>1. To co-ordinate evaluation programmes of the existing coffee collections in the region and develop documentation/information system</li> <li>2. To develop and or assist in implementation of cost effective and reliable conservation technologies</li> <li>3. To increase the use of coffee germplasm from ex situ collections</li> </ol>	<ol style="list-style-type: none"> <li>1. Research results showing increased use of coffee germplasm collections</li> <li>2. Genetic diversity readily accessible</li> <li>3. Database of coffee genetic resources set up</li> </ol>	<ol style="list-style-type: none"> <li>1. Reports of research institutions</li> <li>2. Number of accessions conserved in genebanks</li> <li>3. CD Roms made available and websites in place</li> </ol>	<ol style="list-style-type: none"> <li>1. High yielding varieties meet market requirements, provided cost effective technologies are readily adoptable.</li> </ol>
<p><b>OUTPUTS:</b></p> <ol style="list-style-type: none"> <li>1. Multi-location trials established</li> <li>2. Methodologies for establishing core collection developed</li> <li>3. Germplasm exchange mechanism for participating countries</li> <li>4. New coffee germplasm collected and conserved</li> <li>5. Project experiences disseminated to wider audience</li> </ol>	<ol style="list-style-type: none"> <li>1. Multi-location trials in each of the participating country</li> <li>2. Database system in place</li> <li>3. Letters of agreement or MOU established between participating countries</li> <li>4. Three training programmes to counterparts in target countries</li> <li>5. Dissemination workshop held.</li> </ol>	<ol style="list-style-type: none"> <li>1. Workshop report</li> <li>2. Reports of research institutions</li> <li>3. Genebanks records</li> <li>4. PEA Project progress report</li> <li>5. Project completion report</li> </ol>	<ol style="list-style-type: none"> <li>1. Good management and agronomic practices are undertaken</li> <li>2. Technologies developed are appropriate for target countries.</li> <li>3. Efficient supervision and institutional network</li> <li>4. Agreement among participating countries.</li> </ol>

<p><u>INPUTS/ACTIVITIES:</u></p> <ol style="list-style-type: none"> <li>1. Planning workshop and standardize methodologies</li> <li>2. To select from the germplasm collection, a wide range of economically important heritable and characters.</li> <li>3. To develop information system for coffee genetic resources in the region</li> <li>4. To compile passport, characterisation and evaluation data from coffee field genebanks in the region.</li> <li>5. To ensure fair and equitable sharing of benefits for use of genetic resources.</li> <li>6. To conduct investigations on long term storage of coffee pollen and its utilization in exchange programmes</li> <li>7. To set up coffee genetic reserves in key threatened areas of wild coffee</li> <li>8. To collect new germplasm for use by breeding community.</li> <li>9. To hold workshop for share experiences with other countries in Africa.</li> <li>10. Project management activities</li> </ol>	<ol style="list-style-type: none"> <li>1. Training workshops held</li> <li>2. Numbers of accessions of valuable coffee germplasm selected</li> <li>3. Multi-location trials at a minimum of 3 sites in 3 regions</li> <li>4. Documentation system in place.</li> <li>5. Passport, characterization and evaluation data made available</li> <li>6. Mechanism for fair and equitable sharing of coffee germplasm defined.</li> <li>7. Information on the regeneration of coffee in the wild obtained</li> <li>8. Number of coffee genetic reserves established</li> <li>9. Number of new accessions of coffee germplasm added to collections</li> <li>10. Workshops, meetings, visits etc. held</li> </ol>	<ol style="list-style-type: none"> <li>1. Participation at planning workshops</li> <li>2. Progress reports</li> <li>3. Number of accessions in genebanks</li> <li>4. Project completion report</li> <li>5. Publications</li> </ol>	<ol style="list-style-type: none"> <li>1. Funding made available at required time</li> <li>2. Effective project management and execution</li> <li>3. Technical assistance compatible with local environment</li> </ol>
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