International Coffee Organization
Organización Internacional del Café
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Projects/Common Fund

Executive Board/
International Coffee Council
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Breeding coffee plants with durable resistance to Coffee Leaf Rust, anthracnose and other diseases

Project proposal

Background

1. This document has been submitted by the Coffee Board of India and contains a summary of a project proposal for research and development to enhance the genetic endowment of Arabica coffee in the context of disease resistance (Coffee Leaf Rust (CLR) and Anthracnose). The full project is available in English on request.

2. The proposal has been circulated to the Virtual Screening Committee for assessment and will be considered by the Executive Board in September 2005.

Action

The Executive Board is requested to consider this proposal and the comments of the Virtual Screening Committee and, if appropriate, to recommend approval by the Council.

Project Summary

Project title:	Breeding coffee plants with durable resistance to coffee leaf rust, anthracnose and other diseases.
Duration:	Five years. In this phase the major part of the time is devoted to the development of materials in all participating countries. Given the long gestation period of a perennial crop like coffee, the proposed duration of five years is sufficient only for the proposed activities on a small scale (a second phase of two years is needed to assess the impact of new genetic materials on cultivation and production).
Location:	India The ICO/CFC may identify other countries with which partnership modalities can be formulated.
Nature of the project:	Research and development to enhance the genetic endowments of Arabica coffee in the context of disease resistance (CLR and Anthracnose).
Brief description:	The period 1997-2004 witnessed unprecedented low prices for coffee in the international market, leading many small coffee growers all over the world to abandon coffee cultivation or skip plantation maintenance operations in India and, probably, other coffee growing countries. This had a cascading effect on the economies of all countries exporting coffee to earn foreign exchange down to the households producing coffee. In India, the impact of the price crisis led to the large-scale re-emergence of the devastating disease, leaf rust and the deadly pest, white stem borer. At the Central Coffee Research Institute, breeders developed many genotypes combining the genes of Arabica and Robusta coffee to obtain a high degree of resistance to leaf rust. Materials worthy of mention are: Devamachy hybrids (Spontaneous Robusta-Arabica hybrids) and Robarbica hybrids (Artificial Robusta-Arabica hybrids) commercially released as Selection-5 and Selection-6 respectively. These materials manifest

	high resistance to rust and can help tide small growers over the impact of the crisis. The present proposal had its origin in this background. In the course of the project work, it is proposed to ascertain the resistance of these selections to other diseases also with special emphasis on those caused by the anthracnose fungus Colletotrichum.
The estimated total cost:	US$400,940
Financing sought from the Fund:	US$321,680
Mode of financing:	Financing sought as grant.
Co-financing:	By way of counterpart contribution.
Mode of co-financing:	
Counterpart contribution:	US$79,260
Project Executing Agency:	Coffee Board of India
Supervisory Body:	International Coffee Organization
Estimated starting date:	01.01.2006

Logical Framework

Project Title: Breeding coffee plants with durable resistance to Coffee Leaf Rust, anthracnose and other diseases

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTION
Programme goal: The broader objectives a) To improve tolerance/resistance of cultivated Coffea arabica to the main diseases CLR (Coffee Leaf Rust) anthracnose and other diseases causing economically significant crop losses, without compromising quality attributes. b) To optimize disease control measures and render them amenable for practice by small growers. c) To identify socio-economic factors that lead to large disease build-up	Measures of goal achievement a) Increase in the frequency of disease free plants in the population. b) Decrease in disease management cost by the integration of botanicals. c) Beverage quality of new materials. d) Socio-economic index to identify poor farmers who can be the beneficiaries of any assistance schemes.	a) Data on field incidence of disease. b) Survey data on disease management cost. c) Socio-economic data collateral to field disease build-up. d) Certificates of residue analysis laboratories.	Concerning long term value of project a) Continued commitment to develop environmentally benign and sustainable disease control strategies for small grower practice. b) Disease resistance built in to new materials is expected to last for a long time. c) Integration of botanicals and optimized disease control is expected to help small growers in the long run.
Project purpose a) Improve genetic endowments of cultivated *C. arabica* for tolerance/resistance to CLR and anthracnose pathogens and to reduce production costs through planting improved materials in participating countries. b) To protect the environment health through reduced use of fungicides. c) To ensure beverage quality to match standard norms and render it safe for consumption without residues. d) To identify socio-economic factors leading to non-adoption of recommended disease control measures.	Conditions that will indicate purpose has been achieved: End of project status a) Field incidence of disease by scoring in sizeable populations to prove increased resistance. b) Grower acceptance of new materials – indicated by demand for new seed. c) Liquorers reports on the assessment of beverage quality. d) Residue analysis reports. e) Improved disease control by integration of botanicals-direct benefit to growers.	a) Survey to score field incidence of disease. b) Increased demand for seeds of new materials. c) Certificates of beverage quality from accredited Liquorers.	Affecting purpose to goal link a) Leaf rust continues to be a strong constraint for coffee production in India. b) Maintenance of disease resistance in seed progenies by isolation of seed plots. c) Improved disease control methods withstand climatic vagaries.
Outputs a) Development of seed plots in participating countries. b) Improved planting materials for cultivation from isolated seed plots. c) Development of Marker Assisted Selection protocol for seed quality reliability. d) Optimizing disease control measures by integrating botanicals. e) Reduced cost of cultivation by minimizing use of fungicides. f) Assured beverage quality and consumption safety.	Magnitude of outputs necessary and sufficient to achieve purpose a) Increase in seed production based on demand in the respective countries (One kilogram coffee seed produces about 2,000 plantable seedlings). b) Stabilizing the resistance by means of marker assisted selection. Simpler modes of MAS are being developed in India. c) Wide dissemination of the knowledge on botanical use in disease control	a) Detailed analysis of disease resistance levels to understand the behaviour of resistance genes in inheritance. b) Detailed analysis of cost and benefit of cultivating new materials and appraisal by users at the terminal workshop.	Affecting output to purpose link a) New control measures against leaf rust will be effective in consonance with the built-in resistance and are amenable for small grower practice. b) A complete adoption by growers would be ensured if awareness and training in disease control operations continues post project.
Inputs: Activities and types of resources a) Survey and identification of coffee genotypes with possible resistance to CLR and anthracnose. b) Testing these genetic stocks for resistance against CLR and anthracnose, using the standard tests (leaf disc/attached leaf inoculations for CLR and seedling hypocotyl inoculation for anthracnose) to assess level of resistance. c) Increasing the stock by controlled production of additional seed from resistant mother plants as well as cloning. d) Integration of MAS in seed production. e) Beverage quality assessment by cup tasters. f) Testing for pesticide residues. g) Initiation of on-farm trials in small plots in participating countries.	Level of effort/expenditure for each activity Component 1: To produce enough improved seed for carrying out on-farm demonstration trials in ten demonstration plots in India. US$ 300,690 Component 2: Optimization of currently available disease control measures. US$ 60,250. Component 3: Extension and dissemination of project results to farmers and other countries. US$40,000 Component 4: Project Co-ordination (Execution, Monitoring, Financial Administration etc.)	PEA Project Progress Report Annual Progress Reports Participation in advisory committee meetings and terminal dissemination workshop Farm trials of new materials in participation countries Periodic reports and onsite visit to assess progress in implementation	a) Financing from all sources is to be made on a timely basis in tune with proposed activities and annual work plan, budget etc. b) The PEA and collaborative institutions co-ordinate and execute project efficiently. c) All project participants remain committed to project purpose. d) Socio-political developments should not prevent effective project implementation.