Project Proposal :
International R&D Services for durable genetic control of two destructive diseases in Arabica Coffee

CIFC
Coffee Rust Research Centre
Oeiras, Portugal

NCRCs Producing Countries

Brazil:	EMBRAPA, IAC, UFV, etc
Colombia:	CENICAFE
Costa RICA:	ICAFE
India:	CBI-CCRI
Ethiopia:	EIAR-JARS
Kenya:	CRF
Tanzania:	TaCRI
Angola:	INCA
etc.	

IRCs Consuming Countries

France:	IRD, CIRAD, SupAgro
UK:	CABI
etc.	

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CLR: Coffee Leaf Rust (*Hemileia vastatrix*)

- Most important disease in Arabica coffee worldwide (more than $ 1 billion annual economic damage)
- Biotrophic pathogen with high adaptive capacity: 45 physiologic races idientified to date; strict quarantine measures required
- Difficult to breed for durable host resistance (GM ?)

CBD: Coffee Berry Disease (*Colletotrichum kahawae*)

- CBD still restricted to Arabica coffee in Africa: can quickly destroy >80% of the developing crop (annual economic damage up to $ 500 million)
- Climatic conditions in high-altitude areas of L. America and Asia very favourable to to this pathogen; strict quarantine measures required
- Difference in aggressiveness of isolates; no physiologic races detected

Results of breeding for host resistance to CBD and CLR in Kenya and Tanzania

cv. KP423
susceptible to CBD + CLR

F1 hybrid cv. Ruiru 11
resistant to CBD + CLR

CIFC (1955): achievements past 50 years
(Centro de Investigaçao das Ferrugens do Cafeiero)

- Central role in **R&D network** with 40 producing countries on CLR
- Identification of **45 rust races**; **world collection** of coffee rust races
- Screening of **coffee germplasm** for host resistance to CLR; identification and maintenance of "**differentials**"
- **Pre-breeding**: most CLR resistant Arabica cultivars grown in L. America, Asia and Africa are based on CIFC releases
- **Genetic studies**: identification of 9 major *SH* genes for CLR resistance
- **CBD**: testing isolates for aggressiveness and screening breeding lines from L. America for CBD resistance
- **Training**: many pathologists and breeders from coffee producing countries on CLR and (more recently on CBD

CIFC

CIFC at Oeiras, near Lissabon

CIFC personnel

physiologic races of CLR

host differentials

inoculation cages

Project rationale

- Cultivars combining yield and quality with resistance to CLR & CBD required for economically and environmentally sustainable production of Arabica coffee
- Full recognition by NCRCs in producing countries of the unique position of CIFC to provide essential R&D support services
- Long-term additional funding required to ensure continued support by CIFC to NCRC's, leading to robust genetic solutions to the CLR and CBD constraints to Arabica coffee production (traditional sources of funding dried up (e.g. from USAID and FAO)

Project objectives

1. Monitoring the evolution of the CLR pathogen worldwide (new rust races) and the CBD pathogen in Africa
2. Maintaining collections of CLR races and differentials; of CBD isolates and resistant genotypes; free access by all NCRCs
3. Supporting physiological and molecular R&D by IRCs in host resistance to CLR and CBD
4. Pre-breeding: developing parent lines with CLR and CBD resistance for NCRCs
5. Training of coffee pathologists and breeders (short-term, MSc and PhD)

Budget *(5 years)*

Estimated total cost	**€ 1,970,000**
Contribution by Portuguese Gvt.	**€ 825,000**
Additional financing (58%)	**€ 1,145,000**

Budget specification for additional financing

Objectives 1 – 4	
Personnel	€ 375,000
Laboratory and office materials	" 55,000
Materials for coffee growing in glasshouses	" 50,000
Heating (glasshouses, 5 months/year)	" 100,000
Liquid nitrogen (storage CLR spore samples)	" 25,000
Library, subscriptions	" 10,000
Travelling	" 50,000
Rehabilitation of glasshouses	" 150,000
Various equipment	" 40,000
Objective 5	
Training coffee scientists from NCRC's	" 290,000
Total	€ 1,145,000

Thank You !

on behalf of the coffee growers