

PD - AAW - 875
53458

UNCLASSIFIED

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D. C. 20523

ROCAP

PROJECT PAPER

REGIONAL COFFEE PEST CONTROL

Amendment No 2

AID/LAC/P-387
CR LAC/DR-81-3

Project Number: 596-0090

UNCLASSIFIED

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE

A = Add
 C = Change
 D = Delete

Amendment Number
2

DOCUMENT CODE
3

2. COUNTRY/ENTITY

ROCAP - CENTRAL AMERICAN REGIONAL

3. PROJECT NUMBER

596-0090

4. BUREAU/OFFICE

LAC

05

5. PROJECT TITLE (maximum 40 characters)

Regional Coffee Pest Control

6. PROJECT ASSISTANCE COMPLETION DATE (PACD)

MM DD YY
12 31 90

7. ESTIMATED DATE OF OBLIGATION

(Under 'B.' below, enter 1, 2, 3, or 4)

A. Initial FY 87

B. Quarter 4

C. Final FY 89

8. COSTS (\$000 OR EQUIVALENT \$1 =)

A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total	375	125	500	2,623	3,377	6,000
(Grant)	(375)	(125)	(500)	(2,623)	(3,377)	(6,000)
(Loan)	()	()	()	()	()	()
Other U.S.	1.					
	2.					
Host Country						
Other Donor(s) Regional		50	50			
TOTALS	375	175	550	2,623	3,377	6,000

9. SCHEDULE OF AID FUNDING (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) ARDN	121	079		3,500		2,500		6,000	
(2)									
(3)									
(4)									
TOTALS				3,500		2,500		6,000	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

011 080 961

11. SECONDARY PURPOSE CODE

R 221

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code BF R/AG TNG
 B. Amount 6,000 4,000 800

13. PROJECT PURPOSE (maximum 480 characters)

To develop an integrated system which employs the combined efforts of regional and national institutions to help control the spread of coffee rust and other coffee pests, particularly as they affect small coffee producers.

14. SCHEDULED EVALUATIONS

Interim MM YY MM YY Final MM YY
0 6 9 0

15. SOURCE/ORIGIN OF GOODS AND SERVICES

000 941 Local Other (Specify)

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment)

The original project purpose will continue as stated, but include a stronger emphasis on increased coffee productivity through 1) pest control training for both researchers and extension agents; and 2) a region-wide dissemination of research results gained by project activities to date.

17. APPROVED BY

Signature

E. L. Brinenan

Title: E.L. Brinenan
 Acting Director

Joe O. Hill
 Controller

Date Signed MM DD YY
08 28 87

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION

MM DD YY
10 14 87

PROJECT AUTHORIZATION

Amendment No. 1

Name of Entity: Inter-American Institute for
Agricultural Cooperation

Name of Project: Regional Coffee Pest Control

Number of Project: 596-0090

1. Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, the Regional Coffee Pest Control Project was authorized on June 2, 1981 (the "Authorization"). The Authorization is hereby amended as follows:

a. Paragraph 1 of the Authorization is deleted in its entirety and the following substituted in lieu thereof:

"Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Regional Coffee Pest Control project for the Inter-American Institute for Agricultural Cooperation (the "Grantee"), involving planned obligations of not to exceed Six Million United States Dollars (\$6,000,000) in grant funds ("Grant") over the life-of-project, from date of authorization, subject to the availability of funds in accordance with the AID OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. The planned life of the project is nine (9) years and seven (7) months from the date of initial obligation."

2. Paragraphs 3.b., c. and d. are deleted in their entirety and the following substituted in lieu thereof:

"b. Condition Precedent to First Disbursement

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement, the Grantee shall furnish to A.I.D., in form and substance satisfactory to A.I.D., signed working agreements with the Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA) and the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) which shall include a detailed work plan for the first year of the Project and the parties' responsibilities and contributions to the Project.

c. Conditions Precedent to First Disbursement of Project Obligation in Excess of \$3,500,000

Except as AID may otherwise agree in writing, prior to any disbursement, or the issuance of any commitment documents under the Project Agreement, of project obligations in excess of \$3,500,000, the Grantee shall furnish to A.I.D., in writing and substance satisfactory to A.I.D.:

(i) a signed agreement by each of the PROMECAFE members for the continuation of PROMECAFE which will govern the working relationships and define the contributions of the parties.

(ii) a signed working agreement with CATIE and contract with ICAITI which includes a detailed work plan for the 1988 calendar year and which outline their respective responsibilities and contributions to the project.

(iii) a time-phased implementation plan including a budget for activities to be carried out by IICA, CATIE, ICAITI and national institutions, detailing actions to be taken and procurement requirements during the first year of the project amendment (calendar year 1988).

d. Conditions Precedent to First Disbursement for Project Activities in Participating Countries

Except as AID may otherwise agree in writing, prior to any disbursement, or the issuance of any commitment documents under the Project Agreement to finance Project activities in any participating country, the Grantee shall furnish to A.I.D., in form and substance satisfactory to A.I.D.:

(1) An executed agreement with each participating national institution which shall govern the relationships of the parties, define the contributions of the parties and shall provide that each participating national institution will, with regard to research, credit and extension activities, give preferential treatment to the needs of small coffee farmers.

(2) A detailed work plan for the first year of the Project.

e. Conditions Precedent to Obligation or Disbursement in Excess of \$3,500,000 for Project Activities in Participating Countries

Except as A.I.D. may otherwise agree in writing, prior to any disbursement, or issuance of any commitment documents under the Project Grant Agreement, of Project obligation, in excess of \$3,500,000 to finance project activities in a participating country, IICA/PROMECAFE shall furnish in form and substance satisfactory to AID:

(i) A written communication that IICA will continue to maintain a separate bank account for the exclusive use of this project and all funds provided to the project by ROCAP are to be deposited herein.

(ii) A letter stating that IICA at its own expense will provide the full time services of a senior data management specialist to work region-wide on the development and application of national research data, the regional analysis of national research data and the climatic/soil analog regional data system developed under the IICA/ROCAP PIADIC project. All data and computer software developed by the program will be fully available to this project.

f. Covenants

The Grantee shall covenant that, unless A.I.D. otherwise agrees in writing, it will:

(i) Provide such goods and services for the Project during the period June, 1981 through December 31, 1990 as may be agreed upon between the Grantee and A.I.D., in an amount not less than U.S. Dollars \$1,494,000, or the equivalent.

(ii) Furnish to A.I.D., in form and substance satisfactory to A.I.D., on an annual basis each year after the first year of the Project, prior to carrying out Project activities in a participating country, a consolidated work plan and budget for all Project activities for that year."

3. Paragraph e. of the original authorization is amended as paragraph "g" and shall provide as follows:

"g. Waivers

(i) Services for testing rust resistant materials, financed by A.I.D. under this Project Agreement Amendment in an amount not to exceed \$15,000, may have their source and origin in Portugal, an A.I.D. Geographic Code 899 country.

Exclusion of procurement from Free World countries other than countries included in the Central American Common Market and Code 941 would seriously impede attainment of U.S. foreign policy objectives and objectives of the foreign assistance program."



Elena L. Brineman
Acting Regional Director

8/21/87
Date

5

REGIONAL COFFEE PEST CONTROL
PROJECT AMENDMENT

(596-0090)

TABLE OF CONTENTS

	<u>PAGE</u>
PROJECT FACE SHEET	
ACRONYMS AND EQUIVALENTS	
PROJECT AUTHORIZATION	
I. PROJECT AMENDMENT SUMMARY AND RECOMMENDATIONS	1
A. Summary Description	1
B. Recommendations	3
C. Summary Project Amendment Budget	4
D. Project Development Team	5
II. PROJECT BACKGROUND	6
A. Background	6
B. Results of the External Final Project Evaluation	8
III. PROJECT DESCRIPTION	11
A. Project Amendment Rationale	11
B. Relationship of the Project Amendment to the ROCAP Strategy and Regional Priorities	13
C. Relationship to USAID Bilateral Missions' Projects	15
D. Project Amendment Goal, Purpose and Strategy	17
E. Role of the Various Implementing Institutions	19
F. Project Activities	21
G. Project Amendment Outputs	35
IV. PROJECT ANALYSIS	36
A. Social Analysis	36
B. Institutional Analysis	36
C. Summary Socio/Economic Analysis	37

	<u>Page</u>
V. FINANCIAL PLAN AND ANALYSIS	42
VI. PROJECT IMPLEMENTATION	50
A. Implementation Procedures	50
B. Procurement Plan	51
C. Project Evaluation	52
D. Conditions and Covenants	52

ANNEXES

- A. Logical Framework
- B. Economic Analysis
- C. Project Evaluation Findings and Recommendations
- D. Procurement Plan
- E. Detailed Activity Budgets
- F. Implementation Schedule
- G. Initial Environmental Examination

ACRONYMS AND EQUIVALENTS

AID	Agency for International Development
ANACAFE	Asociación Nacional del Café, Guatemala
CABEI	Central American Bank for Economic Integration (Tegucigalpa, Honduras)
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza Turrialba, Costa Rica
CICAFFE	Centro de Investigaciones en Café - CICAFFE, Costa Rica
CIDIA	Centro Interamericano de Información y Documentación Agrícola, IICA
CIFC	Centro Internacional de Royas del Café, Oeiras, Portugal
CIRAD	Centro Internacional de Cooperación la Investigación Desarrollo en Agronomía Tropical, Francia
CRIES	Comprehensive Resources Inventory Evaluation System
CP	Conditions Precedent
IAC	Instituto Agrónomico de Campiñas, Brasil
IBRD	International Bank for Reconstruction and Development, Wash. D.C., U.S.A.
ICAFFE	Instituto del Café, Costa Rica
ICAITI	Instituto Centroamericano de Investigación y Tecnología Industrial, Guatemala City, Guatemala
IDB	International Development Bank, Washington D.C., U.S.A.
IHCAFFE	Instituto Hondureño del Café, Tegucigalpa, Honduras
IICA	Instituto Interamericano de Cooperación para la Agricultura, San José, Costa Rica

j-

INMECAFE	Instituto Mexicano del Café, México City, México
IRCC	Instituto de Investigaciones en Café y Cacao, Francia
ISIAP	Instituto Salvadoreño de Investigación Agraria y Pesquera, San Salvador, El Salvador
ISIC	Instituto Salvadoreño de Investigaciones del Café, San Salvador, El Salvador
MAG	Ministerio de Agricultura y Ganadería, San José, Costa Rica
MIDA	Ministerio de Desarrollo Agropecuario, Panamá City, Panamá
MIDINRA	Ministerio de Desarrollo Agropecuario y Reforma Agraria, Managua, Nicaragua
MKN	Ministerio de Recursos Naturales, Tegucigalpa, Honduras
OIRSA	Organismo Internacional Regional de Sanidad Agropecuaria, San Salvador, El Salvador
PACD	Project Assistance Completion Date
PIADIC	Proyecto de Información Agropecuaria del Istmo Centroamericano, IICA, San José, Costa Rica
PROMECAFE	Programa Cooperativo para la Protección y Modernización de la Caficultura en México, Centro América, Panamá y El Caribe, IICA, San José, Costa Rica
ROCAP	Regional Office for Central American Programs, AID Guatemala City, Guatemala
SEA	Secretaría de Estado de Agricultura, República Dominicana
UFV	Universidad Federal de Vicosa, Brasil
USDA	United States Department of Agriculture, Washington, D.C., U.S.A.
qq	100 libras (45.36 Kgrs.)

11

PROJECT PAPER AMENDMENT

Project 596-0090 Regional Coffee Pest Control

I. PROJECT AMENDMENT SUMMARY AND RECOMMENDATIONS

A. Summary Description

The original five year Regional Coffee Pest Control grant agreement was signed between ROCAP and IICA in June, 1981. The project was carried out through PROMECAFE, a regional program under IICA established to coordinate coffee research and provide information transfer services to the countries of Central America, Panama, Mexico and the Dominican Republic. The project assistance completion date (PACD) for the \$3.5 million project was extended at no cost from May 31, 1986 through December 31, 1987.

A recent project evaluation was carried out to assess the accomplishments of the project to date. It was determined that the project had attained and surpassed many of its planned objectives. Some of the major accomplishments include: 1) the attendance of more than 4,500 participants at over 140 national and regional courses and workshops in coffee pest control; 2) the development of a new method of reproducing micro-cuttings for testing at the commercial level; 3) rust control research showing that the amount of chemicals required for application can be reduced by 30%, thus diminishing costs by approximately US\$36-45/hectare annually; 4) current research points to the development of a number of rust resistant strains in the next three years which will have a yield potential well above present varieties; and 5) the combination of micro-cuttings and outstanding resistant plants can bring the region's plant improvement program to the forefront of world coffee development.

The program has brought about major changes in the philosophy and effectiveness for the transfer and adoption of new production methods of pest control and coffee culture by thousands of small farmers. Still, however, a lot remains to be done for the broader dissemination of research results to the majority of existing and potential farmers. Further research is needed in the area of chemical control of coffee berry borer (CBB) and in the coffee residue analysis programs. Ongoing activities have shown that coffee beans have relatively high levels of selected pesticides and heavy metals which must be further researched to determine the source and ways to reduce these amounts to tolerable levels. At this time it is too early to select new superior lines of rust resistant varieties, although the work in this area is progressing well. Further efforts are needed to solidify the research and transfer it to all participating countries, provide for more intensive training programs and strengthen support for other project activities.

The research activities already accomplished under the Coffee project have set the stage for significant changes in the coffee industry of the region. Additional time and funding are now required to achieve the full benefit of these results. The coffee bean borer is migrating to other countries of the region and reducing yields drastically on many small farms in Guatemala, El Salvador and Honduras. In response to this, project research has clearly demonstrated that plantation sanitation and use of the one insecticide known to control the bean borer can greatly decrease production losses. However, additional efficient insecticides must be found within the short-term before immunity is developed to the existing insecticide.

The tissue culture method developed under the project offers a major breakthrough for the entire plant improvement program. This method will permit moving from selected plants to commercial varieties without the thirty to forty years of backcrossing previously required to standardize a variety. However, the tissue culture method has not yet been proven to be a commercially viable practice in PROMECAFE member countries. In addition, further progress is needed in transferring the research and technological options throughout the countries and to the coffee producers themselves. Additional training is required in research and transfer activities, as well as improvement in controlling nutrient deficiencies in the field in order to gain full yield potential from new varieties, pest control and cultural practices.

A proposed three year Project Amendment will provide an additional \$2.5 million to continue to assist regional and national level institutions to combat the spread of coffee rust and other coffee pests, and in turn increase the productivity and income of primarily small farm coffee producers in the region. To accomplish this, the Project Amendment will focus on improving the transfer of information, methodologies, germplasm and new technologies developed to date.

Two key aspects of the amendment will be to provide intensified training in pest control for both researchers and national level extension agents, and to more effectively disseminate research results to coffee growers in the region. New project activities will also serve to better ensure the adoption by farmers of improved coffee pest control practices through training and demonstration programs. In addition, it is anticipated that significant commercial interest will come about as a result of the tissue culture (micro-cutting) facilities to be established under the Project Amendment.

B. Recommendations

The Project Committee recommends that the Director of ROCAP extend the Regional Coffee Pest Control Project for an additional three years. (January 1, 1988 to December 31, 1990). This extension is warranted on the basis of the outstanding accomplishments of the project to date and the need, as identified and strongly supported by the final external evaluation, to further strengthen the research results obtained and transfer these to national coffee associations and larger numbers of small farm producers. It is further proposed that this amendment be signed by ROCAP and the Inter-American Institute for Cooperation in Agriculture (IICA) which successfully carried out the first phase of this program.

No change is proposed by this amendment to the objectives and major activities of the original project. This continuation will permit IICA and the PROMECAFE Project to validate and transfer to all the countries of the region new methodologies developed for coffee propagation, chemical and/or genetic control of coffee rust (Hemileia vastatrix) as well as Coffee Broca (Hypothenemus hampei) and other major production technologies. The amendment will also strengthen the regional technical data and information system, increase the use of the information transfer methodologies at the national level and continue research in areas of major potential.

C. SUMMARY PROJECT AMENDMENT BUDGET

TABLE A
REGIONAL COFFEE PEST CONTROL
(US\$ 000)

LINE ITEMS	ROCAP	IICA	TOTAL
1. Intl. Professional Personnel	226.0	315.0	541.0
2. Local & Gral. Servs. Personnel	487.5		487.5
3. Scholarship & Training	390.5		390.5
4. Travel & Per Diem	131.4		131.4
5. Documents & Materials	215.8		215.8
6. Property, Facilities & Equipment	179.3		179.3
7. Maint., Comm. & General Services	82.0	300.0	382.0
8. Contracts	232.5		232.5
9. Other Costs	61.0		61.0
10. Overhead (8%)	160.5		160.5
11. Inflation (10%)	216.6		216.6
12. Contingencies (5%)	116.9		116.9
TOTAL	\$2,500.0	615.0	\$3,115.0

D. Project Development Team

ROCAP

Nancy Fong	Asst. Agricultural Development Officer
Michael Lofstrom	Project Development Officer
Alejandro Pontaza	Financial Analyst
John McMahon	Deputy Agricultural Development Office
Robert Van Horn	Regional Procurement Officer
Gustavo A. Ruiz	Assist. Program Planning Officer

Consultants

Donald Fiester	Coffee Specialist
Luis Corrales	Economist

Project Review Committee

William Schoux	Deputy Director
Elena L. Brineman	General Development Officer
Joe O. Hill, Jr.	Controller
Gordon Straub	Regional Agricultural Development Officer

Project Authorization

Nadine Hogan	Regional Director
--------------	-------------------

II. PROJECT BACKGROUND

A. Background

1. Basis for the ROCAP Regional Coffee Pest Control Project

Since the introduction of Coffee Rust into Nicaragua in 1976 and the Coffee Berry Borer (Broca) into Guatemala in 1971, the region faced a major threat to its most important export. All of the coffee plants grown at that time within the region were completely susceptible to the major threats of disease facing the industry. As national research and extension services of the participating countries were weak, inadequately supported and not able to find solutions to rust and broca at the national level, a regional research and extension program was designed to best utilize the region's scarce technical and human resource capacity.

In June 1980, IICA, on behalf of the member countries participating in PROMECAFE, entered into an agreement with L'Institut de Recherches du Cafe et du Cacao (IRCC) to provide short and limited long-term expertise to the program. This linkage has proven especially valuable in bringing to the region research and information transfer programs which apply the results of many years of work by the French on coffee pest problems in Africa .

In mid 1980, by mutual agreement between the member countries and IICA, a request was made to ROCAP/AID for additional financial support to expand and strengthen their efforts to find solutions to rust, broca and other pests that limit coffee yields and profits. Due to the high cost of chemical control measures recommended at that time, small and medium-sized farmers were very seriously endangered because of their limited investment capacity and for most an extremely poor understanding of modern cultural as well as disease and insect control measures. At this time, only a few plants resistant to the prevailing race of rust (Race II - with some 32 races known to exist world-wide) were being grown in the region and these were largely commercially unacceptable due to their poor yield characteristics and considerable phenotypic (physical appearance - shape and form of plants) variability.

The Regional Coffee Pest Control Project (ROCAP Project number 596-0090) became operational through a project agreement signed between ROCAP and IICA on June 5, 1981 for \$3.5 million dollars over a five year LOP. The operation of the project was initiated by IICA in January, 1982. ROCAP

subsequently authorized a no-cost extension of the project through December 31, 1987.

2. Nature and Scope of the IICA/ROCAP Coffee Pest Control Project

The Agreement signed between IICA and ROCAP focused mainly on finding appropriate chemical and genetic control measures for rust and broca to develop and evolve improved information transfer systems, create a regional data and technical information bank and provide training. Regional coordination of efforts were emphasized and the technical expertise and genebank at CATIE (the largest coffee security/species collection in the world) as well as the services of OIRSA (Organización Internacional Regional de Sanidad Agropecuaria) and ICAITI (Instituto Centroamericano de Investigación y Tecnología Industrial) were employed in their areas of special expertise. PROMECAFE also signed an agreement with the International Rust Center at Oeiras, Portugal, and the Universidad Federal of Vicosa, Brazil, because of their reputation and expertise in the identification of coffee rust races and the breeding of potentially valuable coffee plants resistant to coffee rust.

The major elements of the ROCAP/PROMECAFE Project focused on actions which, if successful, were considered most important in reducing the threat of coffee rust, broca, and high pesticide residues through fundamental and applied research, information transfer, and training carried out through the coordinated efforts of the participating countries.

The ROCAP Coffee Pest Control Project supported seven activities that contribute to minimizing such limiting factors when the Project terminates. These activities include the following:

- Introduction and testing at the national level, high yielding, rust resistant coffee plants to enable the countries to select two or three varieties for distribution to small coffee growers.
- Study of the biology, epidemiology and control of coffee rust for the purpose of determining the use of more appropriate fungicides, their dosage, time and number of applications and equipment to attain a more adequate and economic control of the disease, particularly on small farms.

- Study of the biology, epidemiology and control of the Coffee Berry Borer to determine the best cultural practices in order to combine these, if possible, with biological and/or chemical pest control.
- Analysis of coffee residues to develop uniform regional methods for maintaining levels within accepted norms.
- Training of technical and auxiliary personnel from national coffee organizations (and/or national Ministries of Agriculture) to overcome the limited national technical capacities in the region.
- Development, adaptation and transfer of appropriate technologies for the rapid and practical incorporation of improved production practices on small farms to increase producer incomes.
- Development of a regional information system and a data bank to serve as a technical reference source and data analysis mechanism for countries participating in the PROMECAFE/ROCAP Project.

B. Results of the External Final Project Evaluation

An external project evaluation was carried out during March and April of 1987. A three person team of specialists in coffee research and information transfer reviewed all phases of the project. They carried out detailed discussions with the administration of IICA, the Project Manager, project and funded senior technical staff members and other project personnel with visits to Panama, Costa Rica, El Salvador, Honduras and Guatemala. Field trips to project activity sites in the member countries permitted the evaluation team to see first hand the activities of the project. The results of the regional yield trials, ongoing research programs and the improved chemical control measures developed for rust and the coffee berry borer were thoroughly assessed. Moreover, a new information transfer system and the results of technical training given in regional and national courses were evaluated. A summary of evaluation findings and recommendations is provided below, more detailed information is provided in Annex C.

The evaluation noted that "coffee generates over 2.5 million jobs annually" among the project's member countries. It provides over U.S.\$1.3 billion in foreign exchange and is grown on over 250,000 small farms throughout the region.

In terms of the project's operations, the Final Project Evaluation noted that "The Coffee Pest Control Project has had a remarkably positive effect on national research and information transfer programs regionwide. It has also solidified the coordination efforts, at all levels, among the participating countries. As a result, it has gained the strong support of national coffee institutions and the Ministries of Agriculture".

The project has had very good overall leadership and has managed its personnel and expenditures prudently within budget limitations. The PROMECAFE Advisory Council, comprised of representatives of each country's coffee association, has met regularly and made sound decisions on overall project operations as well as in new areas of research and transfer within the scope of the project. It has also promoted greatly improved coordination of efforts and the exchange of plant materials and research results regionwide.

The project has attracted the support of other technical assistance institutions as well. The IRCC of France has placed three highly qualified coffee specialists in the area who continue to serve a key role in the overall effort. Likewise, the CIFC (Portugal), the Federal University of Vicosa (Brazil) and CENICAFE (Colombia) provide plant material and test new crosses of coffee plant from in Central America for various races of rust. The cooperation of ICAITI in residue testing and CATIE in a range of project activities is noteworthy. A number of private companies have also provided agricultural chemicals and analytical procedures to this regional effort. Extra regional collaboration of this amendment would not have been possible on a purely bilateral basis.

The Project's extensive training program surpasses project goals and has, through training courses and publications, had a significant effect on the technical understanding of modern coffee production, research methods, cultural practices, rust and coffee berry borer epidemiology, and control and laboratory procedures throughout the region.

Some of the specific accomplishments attained by the project to date include the following:

1. Rust control research has shown that only one to three sprays of a copper based fungicide applied at the proper time are needed to

control rust, and that the amount of chemical required per application can also be reduced by 30% thus reducing small farmer costs for rust control by an estimated US\$36 - US\$45/hectare annually.

2. Research on coffee berry borer (broca) control indicates that the damage from the insect varies from year to year and from area to area and that when the infestation is low, the removal of fallen fruit and late maturing fruit alone on small farms can reduce the infestation the following year to below 10%. In high infestation years, the number of applications of "Endosulfán" can be reduced from six to three if properly timed.
3. A new method of reproducing coffee using the tissue culture technique has been developed and is now ready for testing at the commercial level. It can reduce by almost thirty years the time required between selection of a superior rust resistant plant and its release as a commercial variety.
4. The use of a Farming Systems approach to generate appropriate technology combined with the extension technique of farmer groups (Grupos de Amistad y Trabajo), has proved to be quite successful in raising production levels of small farmers.
5. The project provided a genuine networking vehicle for technician and information exchange between countries and international centers of excellence. This mechanism was very beneficial in terms of institutional development in the region.
6. More than 4,500 participants have been trained in over 140 national and regional courses, workshops and symposiums.

III. PROJECT DESCRIPTION

A. Project Amendment Rationale

Although the project has realized major accomplishments, there remains a need to continue support to consolidate research findings and promote increased use of improved technologies developed to date. This is discussed in greater detail below.

1. The project has made major progress in reducing the amount of chemicals (fungicides and insecticides) as well as reduced the number of sprays per year required to control coffee rust and the coffee berry borer. However, these new procedures have been adapted only in the countries where they were developed. Additional effort is needed to transfer them to other countries of the area and have them adopted by small and medium size farm operations.

2. Likewise, more modern cultural practices (eg. closer planting distances, more plants per planting hole, better weed control, reduced shade, better plant nutrition, etc.) are not yet widely known and adopted by producers in the region (other than in Costa Rica). There is a strong need to get these new production practices into farm operation throughout the area in order to reduce production costs, increase labor efficiency and farm income.

In order to accomplish this, the group training methodology must be greatly expanded throughout the region, along with greater use of mass media (radio) dissemination for the broader use of cultural practices. The proposed extension is needed to permit much larger numbers of growers throughout the project region to learn about these improved production systems and to employ them on their farms.

3. The project was expected to develop at least 2-3 new rust resistant varieties of coffee by the PACD. This has not been accomplished. The regional trials (five major varieties experiments with various replications of each in different ecological areas of each participating country) are being cared for and data is being accumulated on schedule. However the oldest has produced only three crops. As an absolute minimum, four crops (preferably five) plus an analysis of plant vigor are needed for the fifth year before any meaningful selections can be identified. Thus, two to three additional years are required to fulfill this project activity goal.

The micro-cutting technique has only been developed in the last 6-8 months in the CATIE tissue culture laboratory. This is a major breakthrough. It has not, however, been carried to a commercial scale as yet. This procedure has major implications for new variety selection and the future of coffee production world-wide.

If tissue culture applications can be made commercial, then new interspecific or widely different in-species crosses can be made, individual plants with desired characters identified (eg. combinations of rust, Colletotrichum coffeanum and other diseases resistance, insect resistance, as well as special cup quality characteristics or special morphological or physiologically advantageous characters), multiplied asexually, field tested under different conditions and immediately multiplied by millions of plants for use on producing farms.

This new propagation method must be proven commercially feasible in at least three participating countries for the multiplication of selected new lines from the five regional experiments. When proven commercially competitive with conventional procedures, private nurserymen will be trained at the national level in this new method of propagation and encouraged to produce the new outstanding clones for sale to farmers.

4. Only one chemical (Thiodan) has as yet been found which effectively controls the coffee berry borer. This places the entire industry at the mercy of one company which could increase the price or reduce the availability of the material in any country at any time. Likewise, the availability of only one product may result in the development of CBB resistance to this product. Screening of a wide range of insecticides is extremely urgent to find alternate effective insecticides as soon as possible.

The data banks, both nationally and regionally must be greatly strengthened. IICA has permitted the PIADIC data banks to become almost non-operational. With the large amount of new information being developed from national and regional trials, and new superior rust resistant germplasm being identified, the project needs to use an extrapolation data base to identify where these new selections can be commercially employed.

The initial analyses of coffee for harmful levels of pesticides and heavy metal residues are not conclusive (analyses have not been made on roasted and brewed coffee). They seem to indicate that there is a high level of lead in many commercial fungicides and possibly in the coffee bean itself. Further study of

this problem is urgently required in order to set chemical standards for fungicides used on coffee and determine the source and level of heavy metals and pesticides and in coffee itself. It is also essential to know if these residues are readily transferred to a cup of coffee itself. If not clarified and all precautions taken to assure that the coffee sold from the PROMECAFE area is of the highest quality, and without contamination, the consuming countries may place restrictions on imports that would prove economically damaging to the producing nations of the area.

From the above, it is clearly evident that this project has made excellent progress. The research findings on micro-cuttings, rust and CBB control, the group training methodology, the overall training program for both researchers and extension agents and coordination of the area's research and transfer capacity and resources to solve real producer problems are noteworthy. However, to assure that the new findings become known, understood and used throughout this region require more time than envisioned in the original project. This extension is clearly justified to consolidate on the gains made to date and begin to explore new commercially profitable solutions now possible as a result of the progress made by this project.

B. Relationship of the Project Amendment to ROCAP Strategy and Regional Priorities

In Central America the problem of external indebtedness continues to be a major obstacle to stabilizing the economies of the region and increasing economic growth. Coupled with this is the steady deterioration of the terms of trade of the countries of the region, which in contrast to the experience with previous periods of economic recovery, has not brought about increased prices for primary goods exported from the region. In addition, the flight of capital has worsened over the past few years and is expected to persist as a barrier to increased capital formation and investment in Central America.

On the plus side in the Central American region, however, is the rapid technological change and productivity improvement introduced over the last few decades which have generated a much larger and more complex agricultural sector, with an improved ability to adapt to changing situations in the national and international economy. Despite the prolonged crisis and continued socio-economic problems facing the countries of the region, the agricultural sector has served as a major, dynamic reserve for growth in the region. Its strong performance, although uneven in the past, will be critical to overcoming the current economic stagnation and increase future growth of the region.

As a means of supporting policies and programs designed to help stabilize Central American economies and increase economic growth, one of ROCAP's primary goals and that of all USAID bilateral Central American missions as well, is to increase agricultural production in the region. To achieve this goal, ROCAP and bilateral USAIDs have in place a portfolio of projects which provide for policy incentives, operational and investment credits, and technical assistance and applied research, all geared toward increasing the production of traditional and non-traditional export and domestic food crops.

ROCAP's role in the region vis-a-vis bilateral USAID programs, and as stated and supported by AID Washington and endorsed by all Central American USAID Deputy Directors at a meeting held in May, 1987, is to address those development constraints which lend themselves to regional and/or a combined regional and bilateral approach. This approach can be summarized as: 1) regional projects which by definition possess significant economies of scale; and/or 2) projects which serve to build and strengthen regional institutional development.

The original Coffee Pest Control Project and the proposed Project Amendment are in line with, and supportive of, both the macro-economic objectives of increasing agricultural production in the region and the ROCAP mandate of focusing on regional projects and regional institutional development. The Coffee Pest Control Project Amendment is designed to increase agricultural production and, in turn, rural farm incomes by improving and developing new methods of growing coffee, controlling disease propagation, reducing the incidence of coffee pests, and employing the use of tissue culture techniques to reproduce high yielding rust resistant coffee varieties. Another key objective of the amendment is to promote commercial interests in the adoption of new coffee strains that will lead to increased investment in coffee, the creation of additional jobs and the generation of more foreign exchange for the countries through increased exports and more efficient and cost effective coffee production.

The primary institutions to be strengthened under the project will include PROMECAFE and all of the national level coffee producer organizations which network throughout the region. Over the course of the project, CATIE will improve its breeding and tissue culture capabilities with the establishment of a coffee genetic improvement program and the transfer of its new tissue culture propagation system to cooperating countries and the respective private sectors.

A recent agricultural sector assessment financed by ROCAP pointed out that, "increasing the productivity of traditional crops through known technology can significantly improve the national competitive edge and comparative advantage despite trends toward lower international prices. The problems of lower future prices for traditional export products should therefore be addressed through a compatible balance of risks and returns for both traditional and non-traditional crops." Coffee is one of the four major crops of the region and number one in terms of export earnings. Only in Honduras and Costa Rica have major efforts been directed at increasing the productivity this major export, despite the fact that coffee yields throughout the region are very low and the Honduran experience demonstrates that highly productive technology is available and cost effective even with much lower world commodity prices. This yield-increasing technology also permits production to shift to rust resistant, higher quality varieties, so that national income can be maintained and expanded; stronger marketing quotas notwithstanding.

C. Relationship to USAID Bilateral Missions' Projects

GUATEMALA:

Currently, the USAID/Guatemala mission does not have an on-going coffee project. All technical assistance and credit to coffee in the country provided by the USAID is channeled through the Guatemalan Penny Foundation. For FY 1989 the mission is planning to develop a new project on Traditional Commodities Support, which will include coffee as one of the commodities.

Coffee materials and technological recommendations for improvement of coffee productivity, as well as high yielding rust resistance varieties from the ROCAP/PROMECAFE project will be very valuable to the USAID/Guatemala's project.

EL SALVADOR:

The USAID/El Salvador mission is not currently supporting coffee activities in that country. However, under their PL 480 program they are planning to assist the national coffee institute, ISIC, with local currency funding for coffee technology transfer activities next year.

Linkages with the ROCAP project are in providing ISIC with the latest technology in coffee production technology, the methodologies for control of rust and coffee bean borer and rust resistant materials.

HONDURAS:

Honduras has a Small Coffee Farmer Improvement Project which is basically a technical assistance and credit program to assist some 6000 small coffee farmers on an individual basis with para technicians for coffee production improvement.

The ROCAP coffee project will complement the activities developed under that project by providing the national coffee institute, IHCAFE, with the methodologies available under the project to control coffee rust, coffee bean borer and in providing the new rust resistant materials.

IHCAFE has a pilot group training technical assistance program working in one department of the country. There are approximately 2000 small farmers receiving assistance under this program.

COSTA RICA:

The USAID/Costa Rica bilateral mission is currently funding a \$20 million local currency project on Coffee Technification and Diversification, which is a credit project to assist the cooperative sector in coffee technification. It is a long-term project of 12 years.

The ROCAP project will assist FEDECOOP, the implementing institution of the project, in providing the information on the improved coffee production technologies, methodologies for control of coffee rust and rust resistant materials.

PANAMA:

The USAID/Panama mission does not have a current project in coffee and does not plan to initiate a coffee project. Assistance provided to date to the coffee sector has been through the mission's Agricultural Marketing Cooperative Project, which includes assistance to two large coffee producing cooperatives in coffee production improvement.

Potential linkages with the ROCAP Coffee project could be in introducing the new rust resistant varieties in the country and training local staff in the methodologies for control of coffee rust.

Other Donor Support

As was noted in the evaluation, the project has greatly benefitted through the active participation of the IRCC, AID, CIFC, and others, in both research and extension/information transfer activities. In this amendment to the project, it is expected that this linkage can be strengthened even further. There is already an offer by CIRAD (Centre International Pour La Recherche et Le Development en Agronomies Tropical -the parent organization of the IRCC) of France to increase their support to this program by providing a senior coffee breeder to CATIE in addition to the two staff members now working in the program. The IDRC of Canada is currently discussing ways in which they may provide small national/regional project assistance to PROMECAFE.

D. Project Amendment Goal, Purpose and Strategy

There will be no change in the overall Project Goal and Purpose. The Goal continues to be to increase the incomes of small farm coffee growers in Central America. The primary purpose of the Project Amendment will continue to be to develop an integrated system employing the combined efforts of regional and national institutions to help control the spread of coffee rust and other pests, particularly as they affect small coffee producers.

The overall effort will continue to be directed by a senior coffee professional working through the Directorate for Operations in the Central Regional Office of IICA. It will also continue to use the Advisory Council, made up of one representative from each national coffee (or Ministry of Agriculture) institution, with a representative from CATIE, OIRSA and IICA, an arrangement that has been extremely effective and supportive to the overall program during the past five years.

This extension will build on the project's very successful program to date. It will greatly increase, in this second Phase, the emphasis on promoting the utilization of the best production practices known and incorporate the results of continuing project research on coffee rust and coffee Berry Borer control. It will emphasize the transfer of this knowledge to stimulate larger numbers of small farmers to put these new, cost saving and production enhancing practices into their farm operations. This extension will stress the improved techniques for more thorough training practices, information transfer, development of improved producer production, expanded use of the successful group training system and the increased use of mass media radio education programs to reach larger members of farmers who are not members of groups as well as provide more publications for small producers.

By the end of 1988 the first rust resistant selections will be ready for initial commercial use on small farms. Once these selections are available, seed or tissue culture will be used to rapidly increase the amount of rust resistant germplasm available for initial planting in 1989. To further emphasize this, the micro-cutting methodology developed in Phase I will be transferred to three countries to demonstrate its potential to local producers. As experience in semi-commercial production of micro-cuttings is proven at the national level, private individuals will be encouraged by training and technical assistance to go into this new business, producing the best rust resistant high yielding selections on a commercial scale for large numbers of small producers.

In late 1987, the first large, computer-based coffee bibliography will be established in each country. In 1988, technicians in both research and extension will be trained in the use of this valuable information source. Through training, project technicians will be taught how to develop better farmer publications on all phases of coffee production.

Although emphasis in this extension will be placed on the use by farmers of the new knowledge evolving from the program, continuing research will not be overlooked. Studies on rust and CBB control will continue to answer key questions on the timing of pest control applications and will be identified for disease control. However, reduced project funding in these areas is anticipated.

Continued testing of new genetic selections for rust resistance through regional trials also will be continued, and additional trials organized which will allow for better plant materials. Collection of data on the ninety plus trials in the region is planned to continue. There will be greater emphasis, at this stage on the physical analysis of coffee bean samples and cup quality of the better resistant germplasm in the participating countries. This is to assure that the new selections are equal to or better in quality than the best commercial varieties now grown.

Since research data is beginning to be accumulated in much larger amounts than previously, and since there is a need to augment the regionwide adoption of national research, increased emphasis will be placed on the development of a regional technical data bank. Moreover, building on the previous IICA/CATIE/ PIADIC data system, this base will be strengthened in order to identify climatological and soil analogs regionwide for specific national research sites. Using this technique, areas in each participating country can be identified where existing national trials/experimental results are potentially applicable in the

shortest time frame possible. This procedure will serve to shorten the time span by many years between conducting research and applying it to small farmer fields.

In addition, further work will be carried out on the residue analysis of coffee to extend the understanding and implications of this issue.

E. Role of the Various Implementing Institutions

IICA

IICA will continue to be the implementing institution and responsible for overall coordination of the project. It will provide a Project Coordinator, a Project Administrator, a senior computer specialist who will establish and maintain the central data bank, a plant breeder who will be stationed at CATIE and be in charge of the development of the rust resistant varieties, a communication/training specialist and two secretaries.

The Project Coordinator will be the Head of PROMECAFE, and he will be assisted by the Project Administrator to manage the project.

IICA is also responsible to sign agreements with CATIE, ICAITI, IRCC and the participating countries to define their contribution to the project.

CATIE

The development and reproduction of rust resistant varieties activities will be continued at CATIE, given the infrastructure facilities already available at CATIE, which were built with project funds. CATIE will also continue to provide the use of land for research and plant reproduction, their coffee variety collection and the use of their computer, laboratories, classrooms and office space for staff working under the project.

Given CATIE's financial limitations, its contribution will be limited to hiring a plant breeder to work in close collaboration with the IICA/PROMECAFE staff assigned to Turrialba in the selection of promising varieties, the introduction of new germplasm, the distribution of experimental seeds or plants to national organizations and in sending materials, for testing to international organizations such as CIFC in Oeiras, Portugal.

- d) Hold two regional workshops on research result validation (20 people per course).

OIRSA

Under the current coffee project, OIRSA was to assume an active role and responsibility for three project activities, specifically, the epidemiology and control of rust, the coffee bean borer control and the analysis and control/registration of pesticides. However, given the financial and technical limitations of the institution, OIRSA did not assume any of its project assigned roles. Its contribution was limited to providing the use of one vehicle in Guatemala for research activities and part-time technical assistance of an entomologist. For this project amendment, it is not envisioned that OIRSA will make any significant contribution to the project.

ICAITI

Under the current project, ICAITI performed the analysis of pesticide residues. Coffee bean samples from six experiments located in El Salvador, Honduras and Guatemala were analyzed to determine their content of lead, copper and fungicides. In addition to the analysis performed, to better determine the limits of tolerance, ICAITI will conduct analyses of dry green beans and of the coffee beverage, which are required to be correlated with the coffee bean analysis.

ICAITI will also collaborate in the organization of a workshop to disseminate the results of the pesticide residue analysis and prepare publications on recommendations and results of the research carried out on residues.

IRCC

The French Coffee and Cacao Research Institute (IRCC) has played a major role in two of the project components, mainly coffee bean borer and tissue culture activities. IRCC provided two long-term technicians to work directly on those activities.

The IRCC entomologist was assigned to Guatemala to work in close collaboration with the national coffee institute (ANACAFE) and the plant breeder on tissue culture reproduction at CATIE in Turrialba, Costa Rica. PROMECAFE has expressed to IRCC its interest in maintaining those two technicians and possibly adding a coffee breeder. An agreement between CATIE and IRCC is expected to be signed for their continued support.

F. Project Activities

The original five major project activities remain the central focus and principal elements of this extension. On the basis of the progress made to date in four of the five original areas of action, some adjustment will be made in order to permit the research results to be completed. Where research on specific production recommendations has now advanced to the point where it can be extended to large numbers of small producers, this will become a major action focus in the workplan for research/extension activities during the next three years.

No change is proposed during this extension in the institutions that comprise the backbone of the PROMECAFE network. This extension will also not change the focus of the current activities of these institution. Rather, as a result of progress made to date by the project in coffee rust chemical control and the selection of new varieties, tissue culture, extension information transfer methodologies, CBB control procedures and technical information exchange, these will be expanded regionwide and increased project resources provided so that it can be employed in national production programs as rapidly as possible.

Other than helping three countries (Honduras, Guatemala and El Salvador) start semi-commercial tissue culture and small coffee processing facilities to support ongoing research, no major additional expenditure will be made by this regional project extension for infrastructure development. These countries will fully fund the buildings and land required, plus the staffs required to operate the facilities. ROCAP funds will be spent for equipping the installations and training their personnel. Most of the national programs have already received assistance for the construction of facilities essential to carry out the basic elements of the research program. These are now in place and being effectively used according to their original purpose.

The major elements of the project and the proposed main focus of activities under this extension follow:

1. Biological Properties of Rust

The original project paper identified two main elements to be addressed under this project component: (a) "to develop a basic understanding of the epidemiology of Coffee Rust (Hemileia vastatrix)" and (b) "determine the efficacy of the available fungicides on sites representative of the principal agroecological coffee producing zones of the region".

Due to the considerable progress made to date the project extension will:

- Increase the regional adaptation and use of the new rust control procedures through:
 - a) Strengthening the coordination and use of results obtained in El Salvador in the other countries of the region.
 - b) Conducting one regional short course for research and extension agents on the new spray control procedures.
 - c) Training national pathologists on all phases of the epidemiology of coffee rust and simplified control methods.
 - d) Publishing the results of the research completed to date in annual reports and the preparation of at least one simple farmer level bulletins/leaflet and one extension publication on rust control.
 - e) Preparation of five radio/mass media programs on efficient rust control measures for transmission via national radio.
- Test spray equipment and improve application efficiency of chemicals for rust, CBB and other disease and insects by:
 - a) Training two Salvadorean technicians in sprayers and application procedures analysis.
 - b) Test at least ten commercial sprayers (knapsack and backpack motor driven equipment) in order to recommend more efficient and durable sprayers for small farm use.
 - c) Publish: two bulletins/leaflets on recommended spray application methods and equipment for use by small procedures.
 - d) Conduct training on improved methods of disease control in the other member countries as part of the coffee production methods regional workshops.

- Continue to refine research on rust control and its epidemiology by:
 - a) Conducting studies on the economic threshold for chemical control.
 - b) Developing a practical indexing method for farm level rust incidence measurement.
 - c) Conducting training of counterparts and extension agents of new findings regionwide in Regional Coffee production workshops and nationally financed short courses.
 - d) Financing six M.Sc. level thesis on various aspects of rust epidemiology and control (genetic and chemical). The scholarships for the students M.Sc. level training will not be funded by this project.

2. Coffee Berry Borer Control

The Coffee Broca (CBB) phase of this program has demonstrated that at the experimental level, with improved plantation sanitation and limited application of chemical control measures, great reductions are possible in the amount of Broca infestation on small and medium sizes plantations. Considerable progress has also been made in understanding the life cycle of this major coffee pest. This work is being carried out in Guatemala with some outreach in Honduras and El Salvador (the only countries where Broca is now found).

During the project extension, this phase of the program will focus on:

- Testing the new CBB control measures on a larger scale in a number of ecological areas in the three initial countries and transfer program results to the remaining producing countries of the network.
- Developing producer recommendations for small and medium sized farm operators, through:
 - a) Preparation of two publications on the life cycle and control of this insect (technical or extension level and farmer level--one each).

- b) Hold one regional/national workshop on plantation sanitation and chemical control for extension agents.
 - c) Prepare five audio visual materials for use in mass media and Grupos de Amistad y Trabajo (G.A.T.) information transfer programs.
 - d) Measure the economic impact of the improved methods.
- Continue research on the economic and biological threshold for improved Broca control through:
- a) Measuring the effect and timing of control measures.
 - b) Measure the loss of production and quality resulting from different levels and types of Broca control.
 - c) Evaluate the effect of complementary agronomic control practices on CBB infestation levels.
- Evaluate the efficacy of alternate insecticides to control coffee Broca:
- a) Developing a controlled environment procedure for rearing Broca insects for use in insecticide screening tests.
 - b) Testing at least twenty insecticides for potential replacement of Endosulfán (Thiodan).
 - c) Field testing the most promising materials experimentally.
- Begin the evaluation of Broca resistance in other species and types of coffee through:
- a) Revision of available literature on this subject. To the extent possible, define the source/reason for this resistance.
 - b) Test at least twenty promising germplasm materials, under Central American conditions, for CBB resistance in the laboratory and/or in the field.
 - c) Work with the IRCC coffee breeder at CATIE to begin introducing this resistance into the new rust resistant crosses being made by the program.

3. Residue Analysis and Control/Registration of Pesticides

Although a large number of coffee samples have been analyzed to date, the results appear to be inconclusive. Pesticide residues of several types have been identified in the coffee bean but it is not known if they would also be encountered in the final cup of coffee. Likewise, although fairly high levels of lead have been found in green bean samples from trees sprayed with cooper fungicides, they are also almost as high in coffee beans from untreated trees. The source of this apparent contamination is not yet known. It is not certain if the analytical procedures may be giving false values or if there is some other source of field contamination in addition to the cooper fungicides applied. Most commercial brands of cooper fungicides have been found to have high levels of lead. Little is known about the lead levels of coffee from other producing countries or if the lead is passed from the dry bean through to the final cup of coffee.

The following activities are planned during the next three years of the project.

- Review the analytical procedures for coffee pesticides residues and heavy metals:
 - a) With the assistance of a consultant, review the analytical procedures and methodologies being used for pesticides and heavy metals detection.
 - b) Make adjustments in analytical procedures as required.
- Review the methodology for conducting field experiments and collecting samples for residue analysis:
 - a) With assistance of an advisor, review the experimental designs, sampling procedures and sampling timing used in past trials.
 - b) Make recommendations in these procedures as required.
- Carry out trials to determine the type and amount of heavy metal residue contamination using the improved experimental and analytical procedures:
 - a) Select and analyze the most frequently used pesticides used in commercial coffee production for heavy metal residues.

- b) Conduct field trials with potentially hazardous materials.
 - c) Collect bean samples.
 - d) Analyze for residues in dry green beans and in the cup liquor.
 - e) Evaluate the results.
 - f) Publish findings and make recommendations to member countries.
- Analyze coffee samples treated with the most important and frequently used pesticides for residues:
 - a) Conduct field trials and collect samples.
 - b) Analyze samples for residues.
 - c) Analyze results.
 - d) Publish the results.
 - Recommend to the countries, such changes or restriction in the import sale and use of pesticides as may be indicated:
 - a) Conduct, with the collaboration of OIRSA and ICAITI, a workshop of the results of the residue research.
 - Develop recommendations for improved registry and import procedures, as may be necessary, for consideration by the member countries:
 - a) Summarize the results of the research conducted on residues.
 - b) Prepare publications on results and recommendations.

4. Development and Reproduction of Resistant Varieties

The project has made a major research contribution to coffee improvement through the development of the micro-cutting method of reproduction. This method is now ready for use in a larger scale in the producing countries to multiply the high yielding, coffee rust resistant lines and especially the highest yielding rust resistant individual plants now under test.

In the extension of this project, three laboratories, each capable of producing from 500,000 to 1,000,000 million plants from the best selections of plants identified by the national programs will be equipped (Guatemala, El Salvador and Honduras). The new resistant clones will be provided for commercial micro-cutting production, and sale for use on small and medium size coffee farms. In the process of demonstrating this new system on a commercial scale at the national level, private individuals interested in entering into the commercial scale, micro-cutting propagation business will be educated on the advantages of this new propagation system. They will be provided with plant material of the new high yielding lines or clones and taught, through in-service training, how it is accomplished. They in turn will build and operate their micro-cutting propagation facilities and sell these new clones to farmers wishing to replant (or plant) the new rust resistant selections on a commercial scale on their farms.

It is not feasible or operationally practical to expect that any government or coffee association can or should become the exclusive suppliers of clonally (via micro-cuttings) propagated plants. The initial installation in each country will be for the purpose of demonstrating this new system, getting the first commercial scale plantings on private farms and demonstrating the system to the private sector. It will be the private sectors entrepreneurial skill that will be essential to supply each nations large scale needs of high yielding, resistant coffee, using plants produced from micro-cuttings. Assuming a present total regional production of 9.0 million bags of export coffee, at a replacement rate of over 5 percent of the plants now in existence will require a minimum of 60.0 million plants per year to meet this need alone. Only the involvement of the private sector in this new business can meet this need.

Since PROMECAFE's best lines of rust resistant coffee in Guatemala, Honduras, El Salvador and Costa Rica are producing at over 50 percent more coffee than the best commercial susceptible varieties today (and the best plants over 300 percent), the demand for this new type of plant is high and will increase significantly more in the next five to ten years. There appears to be no major constraints on demand.

The installations at CATIE for tissue culture, coffee bean processing and field research are now the best in the region, if not in the entire hemisphere. In addition, at CATIE, the technical staff has access to the most complete coffee species and variety collection in the world and probably the best coffee library.

This technical area of the project has made several very important contributions to the program during its initial phase. As a result, during phase II, the focus will be placed mainly on the identification and multiplication of the best lines/plants having rust resistance, good yields, strong plant vigor and superior bean characteristics from the five different regional trials (over 90 separate experiments) planted throughout the region. These new selections will be then planted as clones on small and medium sized farms throughout the region.

The micro-cutting technique will be transferred to three of the participating countries of the program at a semi-commercial level to multiply the outstanding rust resistant plants and distribute them nationally as well as regionally. In the process, the commercial micro-cutting system will be demonstrated to the private sector and individuals encouraged to enter this new enterprise.

Using the experience and new propagation methodology developed by PROMECAFE, the new IRCC funded plant breeder will begin to develop new plant materials resistant to rust with potential resistance to nematodes (a major and growing problem) and several diseases. CATIE itself expects to employ another plant breeder in 1988 to develop more industrially acceptable, high quality coffee varieties. This is a new area that was not feasible until the asexual propagation problem was solved.

In the next three years, this project component will concentrate on the following:

- Train national technicians in various phases of coffee improvement and plant reproduction by:
 - a) Conducting one regional course on asexual reproduction of coffee.
 - b) In-service training of six Central Americans, on the commercial scale micro-cutting reproduction methodology.
 - c) Providing periodic evaluation and follow-up to national micro-cutting facilities.
 - d) Preparing and publishing the asexual propagation method for use by national technicians and private individuals.

- The selection of at least five superior clones/plants having high yield potential and rust resistance for commercial scale multiplication. This will entail:
 - a) Completing the yield tests through the fourth year at CATIE and in the cooperating countries and vigor indexing of the mother plants.
 - b) Determining the bean size and cup quality of the most promising material.
 - c) Asexually multiplying these selected clones/plants and sending material to the other countries for validation testing using analogs as possible.
 - d) Multiplying the selected clones/plants for initial distribution to producers.
 - e) Publishing the description of the final selected lines/clones.

- Prove that the micro-cutting method can be made commercially viable by:
 - a) Providing equipment, during the life of the extension, to three semi-commercial micro-cutting facilities (one each in Guatemala, El Salvador and Honduras) and train two national technicians from each country in their management/use. The cost of the building will be a national contribution.
 - b) Conduct a cost/benefit analysis of this system.
 - c) Publish one operations manual on the system, its management and operations.
 - d) Hold at least one short course on micro-cutting propagation for interested private sector individuals in each of the three countries (not project funded but regional technicians will participate as part time instructors).
 - e) At least two commercial tissue culture facilities are in operation in each country producing at least 750,000 plants per facility per year in 1990. Some 10.0 million tissue culture propagated disease resistant plant are produced by the end of the project from all facilities (Government and private).

- Evaluate available material for resistance/tolerance to one or more other diseases and/or insect problems that limit production on small farms.
 - a) Develop or adapt known methods for determining resistance to diseases/insects by coffee in the laboratory.
 - b) Use this methodology to screen at least one hundred coffee lines/clones that may have resistance.
 - c) Multiply at least twenty of the most promising materials into the high yielding disease/insect resistant selections made by the countries and CATIE and plant in replicated experiments.
 - d) Initiate at least one regional trial using this material.

- Install the central data bank and bring together national and CATIE research data and ecological information in order to develop the regional implications of the networks research program and identify the geographic areas where the results may be applied. This will require:
 - a) That IICA provide one senior level computer specialist to work with national research and extension programs and develop a system of national data transfer to the regional data bank.
 - b) Installing a computer in Guatemala and Panama to record and analyze national research data (all other countries are computer equipped).
 - c) Developing in collaboration with the projects' plant improvement technicians, an improved methodology to select the best lines/clones, for several ecological areas of each country.
 - d) Providing technical advice on computer data entry and analysis to all Central American countries of the system.
 - e) Publishing the regionwide results of four key regional trials and their implications for small producers.
 - f) Developing regional analog maps for at least three national lines/clones selected by member countries.

The data management system of PROMECAFE will have three major functions. First, all data from field experiments on plant improvement, rust resistance (chemical and field sanitation experiments), Broca Research (chemical and plantation sanitation) and cultural practices (planting distances, sun/shade, plant nutrition, disease control, etc.) will be computerized and analyzed nationally using standard systems developed by PROMECAFE.

Secondly, copies of national data (via floppy discs) will be sent to IICA/CATIE for regionwide analysis of the data and an assessment of its potential use throughout the region made by the collaborative efforts of the regional data center and the program's regional technicians. The results of these national and regional data analyses will be published nationally and regionally for use in improving farmer production recommendations.

The third major function of the regional data center will be to update the climatic information initially developed under the PIADIC/CRIES project. This will permit the project to take superior national research results and determine where else in the collaborative countries, similar climate and soil situations exist where the best research results (e.g. clones on lines of rust resistant coffee, rust and broca control, cultural practices, etc.) would be applicable. These similar ecological situations or analogs may greatly speed the process of moving research findings from site specific to regionally usable results applicable on large numbers of commercial farms.

The regional data center will develop the coffee processing software data and analytical system for use by national researchers, the regional system, train technicians in the use and result of analytical procedures and solve their application problems. The PIADIC/CRIES system will be updated by collecting and tabulating the climatic data into the IICA computer system (complementing the 30 plus years already collected by the PIADIC data bank). Using this, develop analog maps that can be used by national technicians regionwide in applying the new technology developed in their country as well as that of other countries of the program in their commercial coffee regions.

5. Development and Adaptation of Appropriate Technology

Friendship and Work Groups (GAT)

The "Grupos de Amistad y Trabajo" (GAT) is a methodology that was developed in Colombia to transfer the improved technologies for coffee production to small and medium size farmers. The methodology consists of grouping farmers from coffee producing areas of the country to teach them through demonstration

plots the improved technological packages. By using this methodology, larger number of farmers can benefit. This methodology has been tested and applied with great success in Guatemala and Honduras.

Extension agents from each of the national coffee associations and/or extension services will be trained in the methodology through national, regional courses and workshops. They will be the ones responsible in grouping farmers from specific coffee producing areas of the countries and train them in the application of the improved coffee production practices.

In this second phase of the ROCAP project supporting PROMECAFE, a very high level of effort and resources will be placed on extending the results of the research in various technical areas, throughout the system. Heavy emphasis will be placed on regional and national courses/workshops to expand understanding and use of the GAT teaching system and techniques of mass media information transfer. The project extension will emphasize the formation of larger number of GAT groups both in the countries where this system is now being used and in the other countries of the region. In addition, several courses will be held regionally and nationally to make known the results of the rust and broca research as well as tissue culture coffee nutrition, general production methods and coffee selection. Throughout this training program, the need and importance of better integration of researchers and transfer agents will be stressed.

During the project amendment in this technical area, the program will:

- Strengthen and expand the GAT and mass media information transfer methodologies both in countries where it is now working and initiate work in other countries of the system where it is not now used. This will require:
 - a) Preparing a publication on the methodology of GAT for use by extension agencies.
 - b) Hold two regional and two national courses in transfer methodology (twenty people per course).
 - c) Conduct two workshops on area characterization (25 people per course).

- 33 -

- d) Hold two regional workshops on research result validation (20 people per course).
- e) Carry out two regional courses on audiovisual methods of mass (radio) information transfer.
- f) Prepare and distribute publications (see rust, broca, and plant improvement programs above for source of materials) to at least 5000 small producers/country in the five countries.
- g) Prepare (see rust, broca above) and use audio or visual materials in workshops and offer them for use in national radio programs in all countries.
- h) Make available photocopies and reprints of important coffee publication/articles to national researchers and extension agents through their national libraries.
- i) Provide follow-up technical assistance to course participants after they return to their national program.

Conduct workshops/seminars for national technicians on technical results of the program. This will entail:

- a) Conducting one regional workshop on residue analysis for 15 people.
- b) Carrying out two regional workshops on the micro-cutting technique of coffee propagation (15 people per course).
- c) Holding one regional course on chemical rust control methods (20 people).
- d) Conducting one regional workshop on CBB control methods (20 people).
- e) Holding two regional workshops on modern coffee production methods (20 people each).
- f) Completing two regional workshops on laboratory analytical procedures and field response recommendations in coffee plant nutrition (total 20 people)

- g) Holding one regional workshop on technical data processing.
- h) Providing in-service training to at least three national program librarians.
- i) Including training in use of the coffee bibliography and preparation of farm publications in conjunction with at least four of the above courses.
- j) Providing follow-up technical assistance to course participants.

6. Technical and Logistical Support

The overall program is managed by the technical Project Leader at IICA. Through his efforts, the overall leadership and coordination of all phases of the program is carried out. This technical and operational leadership is the glue that has and will continue to stimulate and increase regional cooperation and coordination. During this three year extension of the project, this individual and his staff will:

- a) Hold quarterly coordination meetings of the projects key technical staff.
- b) Conduct the annual technical advisory Council meeting.
- c) Coordinate specialized personnel (pathologists, entomologists, etc.), as required to solve problems in the organization and operation of this program.
- d) Visit national programs in all participating countries at least one time per year to assure progress and identify problems that must be solved on a regional basis.
- e) Negotiate and secure such national, regional or developing nation (USAID, IDB, EEC, CIRAD, IDRC, CIFC, etc.) technical and financial support to complement the national/regional activities of this project.
- f) Assure that the project carries out its operational program in a cost effective and technically competent manner.

develop a basic understanding of the epidemiology of Coffee Rust (Hemileia vastatrix)" and (b) "determine the efficacy of the available fungicides on sites representative of the principal agroecological coffee producing zones of the region".

- 35 -

- g) Manage and be responsible for all project funds provided by ROCAP, national contributions to PROMECAFE, funds supplied by IICA and from other sources for the operation of the overall regional program.
- h) Represent the program in international meetings, conferences and other fora.

G. Project Amendment Outputs

By the end of the project it is expected that the following outputs will have been achieved:

1. Methodologies and epidemiological studies for the control of coffee rust and coffee berry borer disseminated in all the participating countries.
2. Testing of spray equipment and improved application of chemicals for rust, coffee berry borer and other coffee diseases completed in at least three countries.
3. Recommendations on the use of pesticides developed and distributed to the national coffee associations in all the participating countries.
4. At least three of the most promising rust resistant plant materials multiplied for initial distribution to coffee producers.
5. An improved methodology to select the best plants for different ecological areas in each participating country developed and distributed to the national coffee associations or Ministries of Agriculture in each participating country.
6. A publication on the transfer of technology methodology "Grupos de Amistad y Trabajo" prepared for the use of extension agents.
7. Extension materials produced and disseminated, including audio visual materials, radio programs and leaflets or bulletins.
8. Technical reports/publications produced and disseminated for each of the project components.

9. Training conducted through workshops, seminars, regional and national courses, on the epidemiology of coffee rust and its control, coffee bean borer control, analysis of residues, development and reproduction of rust resistant materials and the methodology on transfer of appropriate technologies.
10. Establishment of a regional coffee data bank and development of a system to transfer the data to national research and extension programs in all the participating countries.
11. Three commercial tissue culture laboratories established in Guatemala, El Salvador and Honduras for reproduction of the best selections of rust resistant plants.

IV. PROJECT ANALYSIS

A. Social Analysis

Project Amendment Beneficiaries

Three major groups have benefitted and will continue to benefit from this project. First, the national technicians from the National Coffee Associations and Ministries of Agriculture in each of the countries who have received training on the methodologies to control coffee rust, coffee bean borer and appropriate technologies for improved coffee production. The second major beneficiaries are the small and medium farmers that have been the project target groups for technology development and transfer activities. Lastly, the third group are comprised of the resident plantation laborers and the migrant coffee workers hired on all sizes of coffee plantations to pick coffee during the harvesting period.

B. Institutional Analysis

Under this project amendment, IICA/PROMECAFE will continue to be the principal coordinator and responsible for administration of the project. PROMECAFE, a program under the auspices of IICA, was created in 1979 to promote research and development of improved technologies for coffee production throughout the region. The Advisory Council of PROMECAFE is integrated by representatives of the six Central American countries plus Mexico and the Dominican Republic, with the Director of PROMECAFE serving as chairman.

The other collaborating institutions will be CATIE, ICAITI and the IRCC, in addition to the Ministries of Agriculture and the National Coffee Associations in each of the member countries. An agreement between IICA and the member countries has been signed for the continuation of PROMECAFE for five additional years beginning January 1, 1988. Each member country will provide \$20,000 dollars of annual quota contribution in dollars or in local currency at the highest legal exchange rate.

Three tissue culture laboratories are expected to be established, one each in Guatemala, El Salvador and Honduras, by the National Coffee Associations. A written communication will be requested from these associations indicating their interest and agreement in establishing those facilities, which will serve as demonstration units for reproduction of rust resistant materials on a commercial scale.

The limitations and capabilities of the institutions having responsibilities for implementing the project were evaluated by a team who performed an evaluation during March and April of 1987. The evaluation report indicated that the project has been well managed and administered by IICA/PROMECAFE and noted the significant results obtained to date and the effectiveness of IICA's technical leadership and administration.

Given the fact that the original arrangement has worked well, we will continue to maintain it with IICA, who has considerable experience in the administration and implementation of complex multi-institutional regional agricultural programs.

C. Summary Socio/Economic Analysis

1. Investigation Activities of the Project

In the framework of the Regional Coffee Pest Control Project, all the Central American countries through their specialized coffee institutions have undertaken a series of investigations. These investigations have been oriented towards the introduction, adoption, and evaluation of the different varieties of coffee rust resistant plants, also, to evaluate the efficiency of fungicides and pesticides, specifically, information pertaining to the dosage, time number, and method of applications. Additional research also provided a way of designing and executing packages and technological options in order to improve the production and reduce the effect of the different pests. Finally, research provided a way of improving technology transfer targeted to small producers.

2. Results of Investigation and the Impact of their Implementation

2.1 Evaluation and Adoption of Varieties Resistent to Rust

This scheme was aimed at achieving the selection of new varieties of coffee that besides being resistent to rust, showed equal or superior yield characteristics to commercial varieties, good vegetative strength, uniform presentation, resistance to other diseases, low percentage of waste beans, and beans of good drinking quality.

Among the new varieties that the investigation bodies selected, the following was found in Costa Rica, the CATIMORES T-5159, T-5175, T-5269, and TH-387, evaluated in six harvests; the T-5315 (1-3) and T-5307 (1-5), evaluated in two harvests. In El Salvador, the CATISIC, the YELLOW CATUAI x HW 26/23 (327-3), and the BOURBON x 26/9; in Guatemala the T-5175; and in Honduras, T-5175, T-8663 (1-3), and T-8659 (4-5).

These new varieties were comparatively evaluated with those commercial varieties most representative of each country, and they showed superiority on all the previously mentioned characteristics.

In Costa Rica, El Salvador, and Honduras, experimental areas have been set up for the commercial reproduction of the promising new varieties.

2.1.1 Expected Socio-Economical Impact from the Adoption of the New Varieties

The expected socio-economic impact will be seen in three different forms:

a) There will be an increase of income for the coffee producers due to the high yields and the reduction of costs, as a direct effect of the use of chemical control. It is estimated that in Costa Rica the income per coffee producer will increase, per coffee-established manzana, by approximately US\$3,679; in El Salvador, an increase of US\$1,530; in Honduras, the increase should be almost US\$3,000; and in Guatemala the increase is expected to be US\$980.00.

b) It will incorporate new coffee producers who in their tenth year of having started their plantation will obtain financial returns of 45%.

c) By the year 2,000, the project will serve to free up approximately 66% of the areas that will be needed for the cultivation of coffee if the new varieties are adopted. This new planting area could also be used for others.

2.2 Reduction in the Number of Sprayings of Chemical Control of Coffee Rust and its Impact on the Producers' Income

Due to the recommendation of reducing the chemical spraying from six to three for the control of coffee rust, and also to apply spraying when the disease is at its lowest level, the producer's income will improve due to a reduction in cost and an increase in the yield per unit of area.

In Costa Rica, the producer's income increased by 10%; in El Salvador, the small producers will obtain an increase of more than 50% and the medium size producers will double their income in Honduras, the small and medium size producers will most likely obtain an increase of 31% and 20% respectively and; in Guatemala, all producers will substantially increase their income by approximately 143%.

2.3 Manual Control of Berry Borer

The manual control of Berry Borer has had an important effect in the cleaning of plantation and it has generated socio-economic benefits to all producers.

ISIC estimated that in El Salvador Berry Borer manual control per manzana of coffee has a cost of US\$76.72, which includes labor and one application of pesticide; from these activities is obtained approximately 1 qq/gold/coffee, and a second application of pesticide is not required. This relationship shows a cost-benefit factor of 1.18, which demonstrates positive return on investment.

2.4 The recommended technological packages for production improvement have been oriented in Honduras and El Salvador, toward the small and medium producer.

In Honduras, with the adoption of the technological packages, small producers will increase their yields from 5 to 13 qq/gold/manzana, and medium size producers will increase their yields by 9 to 18 qq/gold/manzana, both in the same period of four years. With the adoption of these technological packages the cost-benefit factor increases from 1.61 to 1.89 for the small producers and from 1.73 to 1.93 for the medium size producer.

In El Salvador, with the adoption of the technological packages the small and medium size producers will double their yields. The former will obtain a cost-benefit factor from 1.09 to 1.24 and the latter from 1.13 to 1.36 over the same four year period.

2.5 Socio-economic and Technical benefits obtained from Group and Individual Technical Assistance

The advantages over individual technical assistance, due to a better relationship with the producers in the analysis of and research on a variety of problems, allows more attention to be given to a greater number of producers with a resulting lower cost impact compared to individual producers.

In 1985-86 IHACAFE estimated that to technically assist a group of GAT, there is cost of US\$160. Considering the average size of every associates' farm of 3.6 hectares, the cost of technical assistance per hectare under the project will be reduced to US\$50.

The cost per beneficiary per year for individual technical assistance was estimated to be US\$860 in 1982, US\$734 in 1983, and it is expected to increase to US\$210 in 1989. Renovated fields costs per manzana were US\$574 in 1983, US\$296 in 1984, and will be further reduced to US\$296 in 1989.

In relation to these two modes of technical assistance, the importance of the para-technician as a new element was clear in terms of greater coverage and lower cost of technical assistance. The para-technician provided technical assistance to an average of 30 coffee producers in 1986/87, and this helped to increase the number of assisted coffee producers from 2,840 to 5,890, with approximated 33% of coffee producers server either individually of through groups.

TABLE B

HONDURAS: COMPARATIVE INCOME ANALYSIS IN COFFEE FARMS,
COMMERCIAL VARIETIES AND RUST RESISTENT VARIETIES

(In US Dollars)

Components	Costa Rica	El Salvador	Honduras	Guatemala
<u>I. COST OF PRODUCTION</u>	<u>1,011.69</u>	<u>451.83</u>	<u>337.67</u>	<u>767.06</u>
<u>1. Cultivation Phase</u>	<u>561.29</u>	<u>196.26</u>	<u>162.92</u>	<u>370.49</u>
Supplies	240.93	60.35	72.80	165.69
Labor	257.99	85.37	67.50	153.41
Cost of Operation	62.37	50.54	22.62	51.39
<u>2. Harvest Phase</u>	<u>450.40</u>	<u>255.57</u>	<u>174.75</u>	<u>396.57</u>
Labor	388.03	210.16	135.00	306.83
Transportation		14.02	22.50	51.39
Cost of Operation	62.37	31.39	17.25	58.35
 <u>II. INCOME</u>				
Gross Income <u>1/</u>	2,330	520.80	585.00	1,046.18
Net Income <u>1/</u>	1,318	68.97	247.33	297.12
Gross Income <u>2/</u>	6,000	2,046.00	3,575.00	2,034.21
Net Income <u>2/</u>	4,918	1,594.17	3,237.00	1,267.21

Note 1/: Commercial Varieties yields: Costa Rica (23 qq/oro/Mza.); El Salvador (14 qq); Honduras (9 qq); and Guatemala 10.8 qq).

Note 2/: New Varieties yields: Costa Rica (60 qq/oro/Mza.); El Salvador (55 qq); Honduras (55 qq) and Guatemala (21 qq).

Source: "Socio-Economic Analysis of the Impact of the Regional Coffee Pest Control on Coffee Producers". ANNEX 3-5.

V. FINANCIAL PLAN AND ANALYSIS

This three year amendment to the Regional Coffee Pest Control Project (596-0090) will draw on several resources of funding and in-kind contributions to finance operations. These funds will come from AID, the participating countries themselves and from other donors.

A. AID Contribution

The total AID contribution for this three year extension is estimated at \$2,500,000. The breakdown of this expenditure by category and activity is presented in the summary financial plan Table B.1 and in the annual budget detail of the activity budgets (B.2-B.7) presented in Annex E.

As will be noted, AID grant resources are supplied primarily for local personnel, training, travel and per diem, materials, equipment (primarily vehicle replacement) and equipping three semi-commercial micro-cutting facilities in members countries, equipping national programs with small equipment to process research samples of coffee and the cost of a final external evaluation and annual external audits.

There will be no major construction costs for this second phase of the project. A nominal sum of \$10,000 is budgeted in the construction line item to cover contingencies for possible modification of the existing CATIE facilities, as experience in use of the commercial level micro-cutting system may indicate.

B. IICA Contribution

IICA will provide a Project coordinator, a Project Administrator, a senior computer specialist who will establish and maintain the central data bank, a plant breeder who will be stationed at CATIE and be in charge of the development of the rust resistant varieties, a communication/training specialist and two secretaries for the life of the Project Amendment.

REGIONAL COFFEE PEST CONTROL

SUMMARY FINANCIAL PLAN

FIGURES IN US DOLLARS

CATEGORIES	TECHNICAL & LOGISTIC SUPP.	RUST EPID. & CONTROL	COFFEE BEAN BORER	RESIDUE ANALYSIS	DEV. & REP. OF RUST RES. VAR.	DEV. & ADAP. OF APPRSP. TECH.	TOTAL	%
1. Int'l Prof. Personnel.						226,000	226,000	9%
2. Local & Gral. Servs. Pers.		66,000	60,000	18,000	347,500		487,500	20%
3. Scholarship & Training.	12,000	38,000	10,500			330,000	390,500	16%
4. Travel & Per Diem.	42,600	16,800	16,800	8,400	22,500	24,300	131,400	5%
5. Documents & Materials.	27,000	15,000	12,000	5,000	72,800	84,000	215,800	9%
6. Prop. Facs. & Equipment.	3,000	35,000	12,000	3,000	100,300	26,000	179,300	7%
7. Maint., Comm. & Gral. Servs.	21,000	16,000	11,000		26,000	8,000	82,000	3%
8. Contracts.	114,000	3,500	3,500	67,000	41,000	3,500	232,500	9%
9. Others Costs.	52,000				9,000		61,000	2%
- Overhead (8%)	21,729	15,224	10,064	8,112	49,208	56,144	160,480	6%
- Inflation. (10%)	29,333	20,552	13,586	10,951	66,431	75,794	216,648	9%
- Contingencies (5%)	15,624	11,087	7,329	5,908	35,836	40,888	116,872	5%
T O T A L	338,495	237,164	156,780	126,371	766,575	874,626	2,500,000	100%

TABLE B.1

C. CATIE Contribution

CATIE will provide two senior level researchers in coffee. One of these professionals (a plant breeder on tissue culture reproduction) is currently provided to CATIE by the French Coffee and Cacao Research Institute (IRCC) and will continue under the Project amendment. CATIE is exploring possibilities of obtaining an additional coffee researcher (plant breeder) from the IRCC. If this is not possible, CATIE has agreed to fund a plant breeder from other sources. CATIE will also provide the use of land for research and plant reproduction, its coffee variety collection, research and training facilities including laboratories, classrooms, offices, computer center, library and its coffee processing facility.

D. Member Country Contribution

The member countries of PROMECAFE support the program in several ways. Each is making an annual contribution which is being paid at the rate of \$20,000/year to PROMECAFE for overall program operations. This is paid at the highest legal exchange rate in local currency (or direct in dollars) to IICA on either an annual or quarterly basis.

ational programs will provide personnel and other in-kind costs related to carrying out each country's portion of the overall effort. In addition, three countries (Guatemala, El Salvador, Honduras) will provide an estimated \$15,000 each for the construction of a micro-cutting propagation facility and coffee sample processing facilities, prior to the Project's provision of funding for equipment and operating expenditures for these facilities.

Table C presents the Summary Financial Plan by Year for the three year extension. In Table D there is a breakdown of the foreign exchange 56% and local currencies 44% of total requirements under the project.

TABLE C

REGIONAL COFFEE PEST CONTROL
SUMMARY FINANCIAL PLAN BY YEAR
(Figures in US Dollars)

CATEGORIES	YEAR 1		YEAR 2		YEAR 3		TOTAL	
	A.I.D.	IICA	A.I.D.	IICA	A.I.D.	IICA	A.I.D.	IICA
1. Intl. Proj. Personnel	71,000		74,000		81,000		226,000	
2. Local & Gral. Servs. Pers.	162,500		162,500		162,500		487,500	
3. Scholarship & Training	223,500		153,500		13,500		390,500	
4. Travel and Per Diem	43,800		43,800		43,800		131,400	
5. Documents and Materials	66,300		79,700		69,800		215,800	
6. Prop., Facs. & Equipment	103,600		63,700		12,000		179,300	
7. Maint., Cons. & Gral. Servs.	23,000		29,000		30,000		82,000	
8. Contracts	85,500		49,000		98,000		232,500	
9. Other Costs	23,000		19,000		19,000		61,000	
- Overhead (8%)	64,176		53,936		42,368		160,480	
- Inflation (10%)	86,638		72,814		57,197		216,648	
- Contingencies (5%)	46,737		39,289		39,855		116,872	
TOTAL	999,751		840,229		660,020		2,500,000	

1452a

TABLE D

REGIONAL COFFEE PEST CONTROL
 INPUTS BY CURRENCY UTILIZATION
 (US Dollars)

CATEGORIES	A.I.D. CONTRIBUTION		IICA CONTRIBUTION		TOTAL CONTRIBUTION	
	FX	LC	FX	LD/G	FX	LC
1. Intl. Proj. Personnel	226,000		315,000		541,000	--
2. Local & Gral. Servs. Pers.		487,500				487,500
3. Scholarship & Training	380,000				380,000	10,500
4. Travel and Per Diem	131,400					131,400
5. Documents and Materials		215,800				215,800
6. Prop., Facs. & Equipment	173,300	6,000			173,300	6,000
7. Maint., Cons. & Gral. Servs.		82,000		300,000		382,000
8. Contracts	165,500	67,000			165,500	67,000
9. Other Costs	61,000				61,000	
- Overhead (8%)	90,976	69,504			90,976	69,504
- Inflation (10%)	122,818	93,830			122,818	93,830
- Contingencies (5%)	66,255	50,617			66,255	50,617
TOTAL	1,417,249	1,072,751	315,000	300,000	1,732,249	1,382,751

Exchange Rates:

Guatemala: Q2.75 = US\$1.00
 El Salvador: C5.00 = US\$1.00
 Honduras: L2.00 = US\$1.00
 Costa Rica: C62.00 = US\$1.00
 Panama: B1.00 = US\$1.00

E. Overhead

IICA's overhead fee supports common services. In October 1985, IICA's Board of Directors approved a Resolution establishing an overhead charge for any project. The minimum charge was fixed at 8% base on the total funds provided by the grantor.

Project budget estimates \$160,480 for overhead purposes. It is 8% of total expenses before Inflation and Contingencies. As soon as inflation and contingencies become real expenses, the overhead would rise up to \$200,000 (8% of \$2,500,000).

There exists the possibility of an increase in the overhead rate since the basic 8% was computed based on 1985 figures. We believe that IICA's standard overhead rate should be audited because if it is too low, it will hinder their operations. If the audited rates come out higher, we plan to use the contingency category to cover the extra cost.

F. Audit Coverage

As can be seen in the Technical and Logistic Support Element of the Detailed Activity Budget in Annex E, Table B.2 (8.G.), there will be three External Audits over the life of the project, one at the end of each year. These will be conducted by an independent Costa Rican accounting firm.

As part of their duties, ROCAP's Financial Analysts will periodically visit IICA to review aspects related with PROMECAFE and the financial status of ROCAP project, as well as other financial matters which may arise.

G. Methods of Implementation and Financing

Our assessment on the methods of implementation and financing, as presented did not disclose any departure from Mission preferred methods.

The Advance and/or Direct Reimbursement method of financing will be used for all of the project expenditures. This method is used in the current project and there is no reason for its change.

IICA's accounting records are kept in U.S. dollars, then, accordingly, reimbursements will be made in U.S. dollars.

For replenishment of advances, PROMECAFE will continue submitting a Certified Summary Disbursement Report, accompanied by a list of expenditures. Post payment reviews are performed by ROCAP's Financial Analysts based on random samples of vouchers. In order to facilitate this task, the budgets of this project amendment were developed based on IICA's chart of accounts.

TABLE E

METHODS OF IMPLEMENTATION AND FINANCE

Method of Implementation	Method of Financing	Approximate Amount - US\$000
TA - PSC Instit. Contract	Advance Direct Reimbursement	946,000
Participant Training - Direct Placement	Advance Direct Reimbursement	390,500
Construc. Profit-Making Contractor	Advance Direct Reimbursement	10,000
Commodities & Gral. Services Institut. Procед. (Local Procurement)	Advance Direct Reimbursement	437,800
Other - Trav. & Perdiem Institut. Procед.	Advance Reimbursement	131,400
Commodities	Advance Direct Reimbursement	90,300
	Sub-Total	<u>2,006,000</u>
Overhead 8%		160,480
Inflation 10%		216,648
Contingencies 5%		116,872
	TOTAL	<u>2,500,000</u>

H. Project Replicability (Recurrent Cost Analysis)

It is hard to try to predict three years in advance at what level PROMECAFE will be able to continue project funded activities after AID/ROCAP assistance terminates.

It has been seen that country members of PROMECAFE have a deep commitment on the continuation of this project. At the moment of this paper is written a three to five year extension of PROMECAFE project is under discussion. Of course, the continuation of PROMECAFE is a condition precedent for disbursements.

In spite of the above mentioned, an exercise was conducted to establish a PROMECAFE's probable level of activity the year following PACD. Total figures in US \$(000) by category follows:

<u>Category</u>	<u>Year 4</u>	<u>\$</u>	<u>%</u>
1.	International Professional Personnel	42	50
2.	Local and General Services Personnel	42	50
3.	Scholarship and Training		
4.	Travel and Per Diem	6	7
5.	Documents and Materials	16	19
6.	Prop. Facilities and Equipment	1	1
7.	Maintenance, Comms. and Services	4	5
8.	Contracts	15	18
9.	Other Costs		
		<u>\$84</u>	<u>100%</u>
		====	====

This level of expenditures is equivalent to 4% of second year level of activity (a normal year without the distortion for procurements and close out expenditures).

At the same time, income from quota-country members amounted \$110 thousand in 1986; that is, enough to cover PROMECAFE's activities at its minimum.

Under these conditions, it is expected that PROMECAFE will continue its activities primarily on the dissemination of the information gathered through years of experimentation.

VI. PROJECT IMPLEMENTATION

A. Implementation Procedures

1. Execution

After the project agreement between IICA/ROCAP is signed, IICA/PROMECAFE will proceed to finalize separate agreements with CATIE, IRCC and a contract with ICAITI. IICA will also sign individual working agreements with the National Coffee Associations and/or Ministries of Agriculture depending on the country, which will define the counterpart contribution to be provided by the national associations in terms of technicians, land and laboratory facilities, logistical support and quota payments which will be a condition precedent to the disbursement of project funds.

IICA will subsequently make arrangements for the procurement of the needed laboratory equipment, research supplies and other commodities and begin to advertise for the local technical positions and other administrative and research positions required in the project.

2. Annual Work Plans and Progress Reports

The implementation of the project will follow the estimated timetable shown in Annex F, which chronologically outlines when the major events of the project have been scheduled.

IICA/PROMECAFE and CATIE will prepare annual implementation plans and targets along with corresponding activity budgets which will be consolidated by PROMECAFE and submitted to ROCAP for review and approval prior to signing yearly amendments to the Project Agreement.

IICA/PROMECAFE will also submit quarterly reports no later than three weeks after the end of the quarter and an annual report at the end of the year which will be submitted to ROCAP thirty days after the end of the calendar year.

3. Project Administration

The project will be monitored by a ROCAP Project Officer from the Regional Agricultural Development Office. The Chief of PROMECAFE will be responsible for the overall coordination of the project and will be assisted by a Project

Administrator, assigned to the project by IICA, who will be responsible for the logistical and financial management of the project.

At the national level, this administrator will be assisted in the coordination of activities by a professional assigned to the local IICA office in three countries: Guatemala, El Salvador and Honduras. The national coordinators will be responsible for the research activities, in addition to the administrative and logistical functions of coordinating the collection of data and ascertaining that information developed by the activities are sent to the central IICA/PROMECAFE office; organizing in-service training courses for national counterpart personnel with the assistance of the Training Specialist and providing logistical support for field trips for project funded short-term specialists and other project technicians.

4. Disbursement Arrangements

All project funding will be channeled through IICA, which will submit monthly vouchers in the required format. All project funded technicians will be contracted and directly salaried by IICA. All commodities will be purchased by IICA.

B. Procurement Plan

Under the current on-going project, IICA has been handling technical services contract, local commodities procurement and commodities import, all on their own under Host Country Contracting Procedures. They have accomplished these contracting activities properly and without difficulties in accordance with AID Host Country Contract requirements. Therefore, it is anticipated that during this second phase of the project, IICA will be responsible for all types of procurement. Procurement will include technical services, vehicles, field and laboratory research equipment, computers, and supplies. A detailed procurement plan is given in Annex D.

Waivers

The screening of plant material against all known races of rust at CIFC in Portugal, to allow for procurement of goods and services will require a waiver of HB.1.b. per Section 5C. 4a.2 to include AID Geographic Code 899 countries.

C. Project Evaluation:

Three months before the PACD, an external final evaluation of the project will be conducted. This evaluation will be in addition to periodic in-house reviews of project implementation to be conducted by IICA and ROCAP jointly.

D. Conditions and Covenants:

a. Conditions

i) Conditions Precedent to First Disbursement

Except as AID may otherwise agree to in writing, prior to any disbursement or to the issuance of any commitment documents under the Project Grant Agreement, IICA shall furnish in form and substance satisfactory to AID the following:

Signed agreements with each of the PROMECAFE members for the continuation of PROMECAFE which will govern the working relationships and define the contributions of the parties.

Signed working agreements with CATIE and ICAITI which include a detailed work plan for the first year of the project and which outline their respective responsibilities and contributions to the project.

(a) A written communication that IICA will continue to maintain a separate bank account for the exclusive use of this project and all funds provided to the project by ROCAP are to be deposited therein.

(b) A letter stating that IICA at its own expense will provide the full time services of a senior data management specialist to work region-wide on development and application of the national research data, the regional analysis of national research data and the climatic/soil analog regional data system developed under the IICA/ROCAP PIADIC project. All data and computer software developed by that program will be fully available to this project.

(c) A written communication that the recipient country is up to date in payment of its annual quota in U.S. dollars or local currency at the highest legal exchange rate, before project activities can be undertaken in that particular country.

b. Covenants

Except as AID shall otherwise agree in writing, IICA shall covenant:

- That prior to undertaking project activities in each country each year after the first year of the project, it shall furnish in form and substance satisfactory to AID, a consolidated work plan and budget for all project activities for that year.

(d) A letter indicating that the agreed upon recipient country at its own cost is constructing, has constructed or has adequate existing facilities for the micro-cutting propagation unit, before funds can be disbursed for the purchase of commercial micro-cutting equipment.

(e) A letter indicating that each agreed upon recipient country is constructing, has constructed or has an adequate existing facility for the processing of experimental samples of coffee cherry to dry beans, before equipment for the processing of small samples of coffee for research purposes can be purchased.

(f) IICA/PROMECAFE will furnish AID with a letter giving its concurrence with the environmental mitigative measures and recommendations provided in the Project Amendment IEE (Initial Environmental Examination) (Annex G). Specifically in reference to the IEE Sections VII A and B, IICA/- PROMECAFE will also indicate the procedures, methods and scheduling to be followed in complying with the recommended environmental mitigative measures contained therein.

ii) Conditions Precedent to Disbursement for Project Activities in Participating Countries.

Except as AID may otherwise agree in writing, prior to any disbursement or issuance of any commitment documents under the Project Grant Agreement to finance project activities in a participating country, IICA/PROMECAFE shall furnish in form and substance satisfactory to AID:

A written communication that IICA will continue to maintain a separate bank account for the exclusive use of this project and all funds provided to the project by ROCAP are to be deposited therein.

A letter stating that IICA at its own expense will provide the full time services of a senior data management specialist to work region-wide on the national research data, the regional analysis of national research data and the climatic/soil analog regional data system developed under the IICA/ROCAP PIADIC project. All data and computer software developed by that program will be fully available to this project.

(a) A written communication that IICA will continue to maintain a separate bank account for the exclusive use of this project and all funds provided to the project by ROCAP are to be deposited therein.

(b) A letter stating that IICA at its own expense will provide the full time services of a senior data management specialist to work region-wide on development and application of the national research data, the regional analysis of national research data and the climatic/soil analog regional data system developed under the IICA/ROCAP PIADIC project. All data and computer software developed by that program will be fully available to this project.

(c) A written communication that the recipient country is up to date in payment of its annual quota in U.S. dollars or local currency at the highest legal exchange rate, before project activities can be undertaken in that particular country.

(d) A letter indicating that the agreed upon recipient country at its own cost is constructing, has constructed or has adequate existing facilities for the micro-cutting propagation unit, before funds can be disbursed for the purchase of commercial micro-cutting equipment.

(e) A letter indicating that each agreed upon recipient country is constructing, has constructed or has an adequate existing facility for the processing of experimental samples of coffee cherry to dry beans, before equipment for the processing of small samples of coffee for research purposes can be purchased.

(f) IICA/PROMECAFE will furnish AID with a letter giving its concurrence with the environmental mitigative measures and recommendations provided in the Project Amendment IEE (Initial Environmental Examination) (Annex G). Specifically in reference to the IEE Sections VII A and B, IICA/- PROMECAFE will also indicate the procedures, methods and scheduling to be followed in complying with the recommended environmental mitigative measures contained therein."

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

(INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.)

Life of Project:
From FY 1988 to FY 1991
Total U.S. Funding \$2.5 million
Date Prepared: 8/28/87

Project Title & Number: REGIONAL COFFEE PEST CONTROL PROJECT 596-0090

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p>To increase income of small coffee of small coffee producers in Central America.</p>	<p>Measures of Goal Achievement:</p>		<p>Assumptions for achieving goal targets:</p> <ol style="list-style-type: none"> 1. C.A. governments will support expanded regional and national research efforts in rust and coffee berry borer control and technification of coffee production, with emphasis on the small coffee farmer. 2. Farmers will adopt the methodologies for control of coffee pest and the improved technologies for coffee production. 3. Farmers will plant the recommended rust resistant coffee varieties.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: REGIONAL COFFEE PEST CONTROL PROJECT 596-0090

Life of Project:
From FY 1988 to FY 1991
Total U.S. Funding \$2.5 million
Date Prepared: 8/28/87

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose:</p> <p>To develop an integrated system employing the combined efforts of regional and national level institutions to help combat the spread of coffee rust and other coffee pests, particularly as they affect small coffee producers.</p> <p>The Project Amendment will focus on the transfer of information, methodologies, germplasm and new technologies developed by the regional network to date. The specific purpose of the Amendment will be to improve coffee production over the longer term through: 1) pest control training for both researchers and extension agents; and 2) the region-wide dissemination of research results gained under the original project to date in the five principal areas. Particular emphasis will be placed on the adoption by farmers of improved technologies and private sector commercial applications through the expansion of tissue culture facilities.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <ol style="list-style-type: none"> 1. National institutions will continue to conduct production systems and transfer research as developed in conjunction regional institutions. 2. Trained personnel in regional and national institutions will be performing increased experiments and field trials related to coffee pest problems. 3. Modes and methodologies for application of research results to the small farmer situation will continue to be developed and tested. 4. Continue to improve rust resistant coffee seeds produced and disseminated to small farmers through national institutions. 5. Assist Honduras, Guatemala and El Salvador in developing semi-commercial tissue culture and small coffee farm processing facilities to support ongoing research region-wide. 		<p>Assumptions for achieving purpose:</p>

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1988 to FY 1991
Total U.S. Funding \$2.5 million
Date Prepared: 8/28/87

Project Title & Number: REGIONAL COFFEE PEST CONTROL PROJECT 596-0090

PAGE 3

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Outputs:</p> <p>3. Recommendations on the use of pesticides developed and distributed to the national coffee associations in all the participating countries.</p> <p>4. At least three of the most promising rust resistant plant materials multiplied for initial distribution to coffee producers.</p> <p>5. An improved methodology to select the best plants for different ecological areas in each participating country developed and distributed to the national coffee associations or Ministries of Agriculture in each participating country.</p>	<p>Magnitude of Outputs:</p> <p>2.c. 1 regional short course for research and extension agents conducted on the new spray control procedures.</p> <p>3.a. Select and analyze the most frequently used pesticides for commercial coffee production for heavy metal residues.</p> <p>3.b. Analyze for residues in dry coffee green beans and in the coffee beverage.</p> <p>3.c. Analyze coffee samples treated with the most most important and frequently used pesticides for residues.</p> <p>3.d. Conduct with the collaboration of CIRSA and ICATIL, a workshop of the residue research.</p> <p>4.a. Select 5 superior clones/plants, with the application of at least 3 of these plants for commercial purposes.</p> <p>4.b. Asexually multiply selected clones/plants and send material to the other countries for validation testing using analogs as possible.</p> <p>5.a. Regional analog maps developed and distributed for the three superior clones selected for commercial application.</p>	<p>Filed site visits and reports produced by ICATIL.</p> <p>Project site visits.</p> <p>Data bank at IICA and CATIE established and functioning.</p>	<p>Assumptions for achieving outputs:</p> <p>Qualified research staff and logistical support available.</p> <p>Rust resistant plants will be ready for initial distribution to producers.</p> <p>IICA will appoint the data management specialist.</p>

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1988 to FY 1991
Total U.S. Funding \$2.5 million
Date Prepared: 8/28/87

Project Title & Number: REGIONAL COFFEE PEST CONTROL PROJECT 596-0090

PAGE 3

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Outputs:</p> <p>6. A publication on the transfer of technology methodology "Grupos de Amistad y Trabajo" prepared for the use of extension agents.</p> <p>7. Extension materials produced and disseminated, including audiovisual materials, radio programs and leaflets or bulletins.</p> <p>8. Technical reports/publications produced and disseminated for each of the project components.</p>	<p>Magnitude of Outputs:</p> <p>6.a. Extension agents from each of the national coffee associations trained in the methodology through national, regional courses and workshops.</p> <p>7.a. The methodology "Grupos de Amistad y Trabajo" (GAT) published for use by extension agents.</p> <p>7.b. Audiovisual materials prepared and used in workshops and distributed to national radio programs in all the participating countries.</p> <p>7.c. Photocopies and reprints of important coffee publication/articles made available to national researchers and extension agents through their national libraries (15,000 - 20,000 pages p/yr).</p> <p>7.d. Extension/training materials produced and disseminated:</p> <ul style="list-style-type: none"> - Biological properties of rust (8) - Coffee Berry Borer (5) <p>8.a. Publications prepared and distributed to at least 5,000 small coffee farmers per country in all the participating countries.</p> <p>8.b. Reports produced and disseminated:</p> <ul style="list-style-type: none"> - Biological properties of rust (4) - Coffee Berry Borer (3) - Residue Analysis (3) - Resistant Varieties (4) - Appropriate Technology (1) 	<p>Farmers trained in the application of the improved coffee production pesticides.</p> <p>Project records, reports and publications.</p> <p>Project records, reports and publications.</p>	<p>Assumptions for achieving outputs:</p> <p>An adequate number of extension agents will be available to receive the training and disseminate the methodology.</p> <p>National institutions actively participate in the dissemination process.</p> <p>National institutions collaborate in the dissemination process.</p>

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1988 to FY 1991
Total U.S. Funding \$2.5 million
Date Prepared: 8/28/87

PAGE 3

PROJECT 7-711
PLEMENT I

Project Title & Number: REGIONAL COFFEE PEST CONTROL PROJECT 596-0090

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>9. Training conducted through workshops, seminars, regional and national courses, on the epidemiology of coffee rust and its control, coffee bean borer control, analysis of residues, development and reproduction of rust resistant materials and the methodology on transfer of appropriate technologies.</p>	<p>Magnitude of Outputs:</p> <p>9.a. 1 regional course on chemical control of rust (20 people).</p> <p>9.b. 1 regional course on coffee berry borer control methods (20 people).</p> <p>9.c. 1 regional workshop on residue analysis (15 people).</p> <p>9.d. 2 regional workshops on tissue culture technique (15 people p/workshop).</p> <p>9.e. 2 regional workshops on research validation results (20 people p/workshop).</p> <p>9.f. 2 regional and 2 national courses in transfer methodology (20 people p/course).</p> <p>9.g. 2 workshops on areas characteristic (25 people p/workshop).</p> <p>9.h. 2 regional courses on audiovisual methods of mass (radio) information transfer (20 people p/course).</p> <p>9.i. 2 regional workshops on modern coffee culture production methods (20 people p/workshop).</p> <p>9.j. 2 regional workshops on laboratory analytical procedures and field response recommendations in coffee plant nutrition (20 people p/workshop).</p> <p>9.k. 1 regional workshop on technical data processing.</p>	<p>- Courses conducted and training materials produced.</p>	<p>Assumptions for achieving outputs:</p> <p>Participants from the national coffee associations attend the training activities.</p>

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1988 to FY 1991
Total U.S. Funding \$2.5 million
Date Prepared: 8/28/87

Project Title & Number: REGIONAL COFFEE PEST CONTROL PROJECT 596-0090

PAGE 3

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Outputs:</p> <p>10. Establishment of a regional coffee data bank and development of a system to transfer the data to national research and extension programs in all the participating countries.</p> <p>11. Three commercial tissue culture laboratories established in Guatemala, El Salvador and Honduras for reproduction of the best selections of rust resistant plants.</p>	<p>Magnitude of Outputs:</p> <p>9.l. In-service training to 3 national program librarians.</p> <p>9.m. Training in use of coffee bibliography and preparation of farm publications in conjunction with at least four of the courses listed above.</p> <p>9.n. Course/workshop participants: - Biological properties of rust (20) - Coffee berry borer (20) - Residue Analysis (15) - Resistant Varieties (140) - Appropriate technology (290)</p> <p>10.a. 1 Senior level computer specialist provided by IICA to work with national research and extension programs and a system of national data developed and transferred to the regional data bank.</p> <p>10.b. Install 2 computers, one in Guatemala and the other in Panama to record and analyze national research data.</p> <p>10.c. Provide technical advice on computer data entry and analysis to all participating country.</p> <p>11.a. 3 laboratories established and each capable of producing from 500,000 to 1,000,000 plants from the best selections of plants identified by the national programs.</p> <p>11.b. Provide equipment for the laboratories and train 2 national technicians from each country in their management/use.</p>	<p>- Project records and site visits.</p> <p>Project records and site visits.</p>	<p>Assumptions for achieving outputs:</p> <p>Data management specialist is hired and maintained to work exclusively on the establishment of the data bank.</p> <p>National coffee associations of the three recipient countries have the financial resources to establish the facilities.</p>

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: REGIONAL COFFEE PEST CONTROL PROJECT 596-0090

Life of Project:
From FY 1988 to FY 1991
Total U.S. Funding \$2.5 million
Date Prepared: 8/28/87

PAGE 4

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs:	Implementation Target (Type and Quantity)		Assumptions for providing inputs:
<p>(000\$)</p> <p>1. <u>AID Contribution (\$2.5 million)</u></p> <p>Int'l Professional Personnel 226.0</p> <p>Local & Gral. Servs. Pers. 487.5</p> <p>Scholarship & Training 390.5</p> <p>Travel & Per Diem 131.4</p> <p>Documents & Materials 215.8</p> <p>Prof., Facs. & Gral. Servs. 179.3</p> <p>Maint., Comm. & Gral. Servs. 82.0</p> <p>Contracts 232.5</p> <p>Other Costs 61.0</p> <p>Overhead (8%) 160.5</p> <p>Inflation (10%) 216.6</p> <p>Contingencies (5%) 116.9</p> <p>TOTAL \$2,500.0</p>		<p>ROCAP accounting records.</p>	<p>Inputs will be provided on schedule.</p>
<p>2. <u>IICA Counterpart Contribution</u></p> <p>Int'l Prof. Personnel 315.0</p> <p>Maint., Comm. & Gral. Servs. 300.0</p> <p>TOTAL \$615.0</p>		<p>IICA accounting records.</p>	<p>Inputs will be provided on schedule.</p>
<p>3. <u>CATE & IICC Contribution</u></p> <p>Int'l Prof. Personnel 435.0</p> <p>Scholarship & Training 210.0</p> <p>Travel & Per Diem 13.5</p> <p>Documents & Materials 6.0</p> <p>Prof., Facs. & Equipment 70.5</p> <p>Maint., Comm. & Gral. Servs. 93.0</p> <p>Contracts 18.0</p> <p>Other Costs 15.0</p> <p>TOTAL \$861.0</p>		<p>CATE and the National Coffee Associations records.</p>	<p>Inputs will be provided on schedule.</p>

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: REGIONAL COFFEE PEST CONTROL PROJECT 596-0090

Life of Project:
From FY 1988 to FY 1991
Total U.S. Funding \$2.5 million
Date Prepared: 8/28/87

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																						
<p>Inputs:</p> <p>4. National Insts. Contribution</p> <table border="0"> <tr><td>Int'l Prof. Personnel</td><td>750.0</td></tr> <tr><td>Local & Gral. Servs. Pers.</td><td>1,410.0</td></tr> <tr><td>Scholarship & Training</td><td>210.0</td></tr> <tr><td>Travel & Per Diem</td><td>115.5</td></tr> <tr><td>Documents & Materials</td><td>6.0</td></tr> <tr><td>Prop. Facs. & Equipment</td><td>229.5</td></tr> <tr><td>Maint., Comm. & Gral. Servs.</td><td>393.0</td></tr> <tr><td>Contracts</td><td>18.0</td></tr> <tr><td>Other Costs</td><td>582.0</td></tr> <tr><td><u>TOTAL</u></td><td><u>\$3,714.0</u></td></tr> <tr><td> GRAND TOTAL</td><td> <u>\$7,690.0</u></td></tr> </table>	Int'l Prof. Personnel	750.0	Local & Gral. Servs. Pers.	1,410.0	Scholarship & Training	210.0	Travel & Per Diem	115.5	Documents & Materials	6.0	Prop. Facs. & Equipment	229.5	Maint., Comm. & Gral. Servs.	393.0	Contracts	18.0	Other Costs	582.0	<u>TOTAL</u>	<u>\$3,714.0</u>	 GRAND TOTAL	 <u>\$7,690.0</u>	<p>Implementation Target (Type and Quantity)</p>	<p>National Coffee Associations records.</p>	<p>Assumptions for providing inputs:</p> <p>Inputs will be provided on schedule</p>
Int'l Prof. Personnel	750.0																								
Local & Gral. Servs. Pers.	1,410.0																								
Scholarship & Training	210.0																								
Travel & Per Diem	115.5																								
Documents & Materials	6.0																								
Prop. Facs. & Equipment	229.5																								
Maint., Comm. & Gral. Servs.	393.0																								
Contracts	18.0																								
Other Costs	582.0																								
<u>TOTAL</u>	<u>\$3,714.0</u>																								
 GRAND TOTAL	 <u>\$7,690.0</u>																								

2661j/2664j/bc

ECONOMIC ANALYSIS

1. Investigation Activities of the Project

In the framework of the Regional Coffee Pest Control Project, all the Central American countries through their specialized coffee institutions have undertaken a series of investigations. These investigations have been oriented towards the introduction, adoption, and evaluation of the different varieties of coffee rust resistant plants, also, to evaluate the efficiency of fungicides and pesticides, specifically, information pertaining to the dosage, time number, and method of applications. Additional research also provided a way of designing and executing packages and technological options in order to improve the production and reduce the effect of the different pests. Finally, research provided a way of improving technology transfer targeted to small producers.

2. Results of Investigation and the Impact of their Implementation

2.1 Evaluation and Adoption of Varieties Resistent to Rust

This scheme was aimed at achieving the selection of new varieties of coffee that besides being resistant to rust, showed equal or superior yield characteristics to commercial varieties, good vegetative strength, uniform presentation, resistance to other diseases, low percentage of waste beans, and beans of good drinking quality.

Among the new varieties that the investigation bodies selected, the following was found in Costa Rica, the CATIMORES T-5159, T-5175, T-5269, and TH-387, evaluated in six harvests; the T-5315 (1-3) and T-5307 (1-5), evaluated in two harvests. In El Salvador, the CATISIC, the YELLOW CATUAI x HW 26/23 (327-3), and the BOURBON x 26/9; in Guatemala the T-5175; and in Honduras, T-5175, T-8663 (1-3), and T-8659 (4-5).

These new varieties were comparatively evaluated with those commercial varieties most representative of each country, and they showed superiority on all the previously mentioned characteristics.

In Costa Rica, El Salvador, and Honduras, experimental areas have been set up for the commercial reproduction of the promising new varieties.

bif

2.1.1 Expected Socio-Economical Impact from the Adoption of the New Varieties

The expected socio-economic impact will be seen in three different forms:

a) There will be an increase of income for the coffee producers due to the high yields and the reduction of costs, as a direct effect of the use of chemical control. It is estimated that in Costa Rica the income per coffee producer will increase, per coffee-established manzana, by approximately US\$3,679; in El Salvador, an increase of US\$1,530; in Honduras, the increase should be almost US\$3,000; and in Guatemala the increase is expected to be US\$980.00.

b) It will incorporate new coffee producers who in their tenth year of having started their plantation will obtain financial returns of 45%.

c) By the year 2,000, the project will serve to free up approximately 66% of the areas that will be needed for the cultivation of coffee if the new varieties are adopted. This new planting area could also be used for others.

2.2 Reduction in the Number of Sprayings of Chemical Control of Coffee Rust and its Impact on the Producers' Income

Due to the recommendation of reducing the chemical spraying from six to three for the control of coffee rust, and also to apply spraying when the disease is at its lowest level, the producer's income will improve due to a reduction in cost and an increase in the yield per unit of area.

In Costa Rica, the producer's income increased by 10%; in El Salvador, the small producers will obtain an increase of more than 50% and the medium size producers will double their income in Honduras, the small and medium size producers will most likely obtain an increase of 31% and 20% respectively and; in Guatemala, all producers will substantially increase their income by approximately 143%.

2.3 Manual Control of Berry Borer

The manual control of Berry Borer has had an important effect in the cleaning of plantation and it has generated socio-economic benefits to all producers.

ISIC estimated that in El Salvador Berry Borer manual control per manzana of coffee has a cost of US\$76.72, which includes labor and one application of pesticide; from these activities is obtained approximately 1 qq/gold/coffee, and a second application of pesticide is not required. This relationship shows a cost-benefit factor of 1.18, which demonstrates positive return on investment.

2.4. The recommended technological packages for production improvement have been oriented in Honduras and El Salvador, toward the small and medium producer.

In Honduras, with the adoption of the technological packages, small producers will increase their yields from 5 to 13 qq/gold/manzana, and medium size producers will increase their yields by 9 to 18 qq/gold/manzana, both in the same period of four years. With the adoption of these technological packages the cost-benefit factor increases from 1.61 to 1.89 for the small producers and from 1.73 to 1.93 for the medium size producer.

In El Salvador, with the adoption of the technological packages the small and medium size producers will double their yields. The former will obtain a cost-benefit factor from 1.09 to 1.24 and the latter from 1.13 to 1.36 over the same four year period.

2.5 Socio-economic and Technical benefits obtained from Group and Individual Technical Assistance

The advantages over individual technical assistance, due to a better relationship with the producers in the analysis of and research on a variety of problems, allows more attention to be given to a greater number of producers with a resulting lower cost impact compared to individual producers.

In 1985-86 IHACAFE estimated that to technically assist a group of GAT, there is cost of US\$160. Considering the average size of every associates' farm of 3.6 hectares, the cost of technical assistance per hectare under the project will be reduced to US\$50.

The cost per beneficiary per year for individual technical assistance was estimated to be US\$860 in 1982, US\$734 in 1983, and it is expected to increase to US\$210 in 1989. Renovated fields costs per manzana were US\$574 in 1983, US\$296 in 1984, and will be further reduced to US\$296 in 1989.

62

In relation to these two modes of technical assistance, the importance of the para-technician as a new element was clear in terms of greater coverage and lower cost of technical assistance. The para-technician provided technical assistance to an average of 30 coffee producers in 1986/87, and this helped to increase the number of assisted coffee producers from 2,840 to 5,890, with approximated 33% of coffee producers server either individually of through groups.

HONDURAS: COMPARATIVE INCOME ANALYSIS IN COFFEE FARMS,
COMMERCIAL VARIETIES AND RUST RESISTENT VARIETIES

(In US Dollars)

Components	Costa Rica	El Salvador	Honduras	Guatemala
<u>I. COST OF PRODUCTION</u>	<u>1,011.69</u>	<u>451.83</u>	<u>337.67</u>	<u>767.06</u>
1. <u>Cultivation Phase</u>	<u>561.29</u>	<u>196.26</u>	<u>162.92</u>	<u>370.49</u>
Supplies	240.93	60.35	72.80	165.69
Labor	257.99	85.37	67.50	153.41
Cost of Operation	62.37	50.54	22.62	51.39
2. <u>Harvest Phase</u>	<u>450.40</u>	<u>255.57</u>	<u>174.75</u>	<u>396.57</u>
Labor	388.03	210.16	135.00	306.83
Transportation		14.02	22.50	51.39
Cost of Operation	62.37	31.39	17.25	58.35
<u>II. INCOME</u>				
Gross Income <u>1/</u>	2,330	520.80	585.00	1,046.18
Net Income <u>1/</u>	1,318	68.97	247.33	297.12
Gross Income <u>2/</u>	6,000	2,046.00	3,575.00	2,034.21
Net Income <u>2/</u>	4,918	1,594.17	3,237.00	1,267.21

Note 1/: Commercial Varieties yields: Costa Rica (23 qq/oro/Mza.); El Salvador (14 qq); Honduras (9 qq); and Guatemala 10.8 qq).

Note 2/: New Varieties yields: Costa Rica (60 qq/oro/Mza.); El Salvador (55 qq); Honduras (55 qq) and Guatemala (21 qq).

Source: "Socio-Economic Analysis of the Impact of the Regional Coffee Pest Control on Coffee Producers". ANNEX 3-5.

62

PROJECT EVALUATION FINDINGS AND RECOMMENDATIONS

An external final project evaluation of the Regional Coffee Pest Control Project was carried out in April 1987. The major findings and recommendations of that evaluation are discussed below for each project component.

A. The Epidemiology of Rust

Since the introduction of coffee rust into Brazil in 1970, it has extended into many major production area of the continent. It first appeared in the PROMECAFE areas in Nicaragua in 1976. There, every effort was taken to control or contain it using all of the available technical competence of the western world and financing provided by the Nicaraguan government, CABEI, loans and contributions of other countries of the region. Due to these efforts - not matched by any other similar effort in the hemisphere - the disease was almost eradicated when the nicaraguan civil war broke out. In a short time, it expanded into northern Nicaragua then into Honduras, El Salvador, Guatemala, Mexico, Costa Rica and most recently into the Central area of Panama.

The Project began to address the problem in two ways. The first was to carry out research on the mode of infection, climatic limitations to its development, finding low costs chemicals to control it (eradication was no longer an option), determine the minimum spray schedule and amount of chemical to use and the best equipment for its' control on small farms. The second was to expand research on incorporating genetic resistance into the best commercial varieties.

The ISIC (Instituto Salvadoreño de Investigación del Café) in El Salvador has the leadership for research program. They were assisted by a senior PROMECAFE project funded, pathologist with extensive experience on rust research in Africa.

Results of the extensive laboratory and field research to date have shown that:

1. Systematic development of research can produce significant results in a limited timeframe.
2. Coffee Rust is not a major economic problem when climatic conditions having mean annual temperatures below C, and rainfall below....mt/year are prevalent.

3. Spraying with Copper Oxychlorides and Copper Oxides applied at rates of 1.5 Kg/Ha. of metallic copper/Ha. in two to three well timed applications, rather than the previously recommended (1980-82) use of 3.0 Kg/Ha. in five to seven applications, will give good economic control of this disease.
4. Copper based fungicides give better control of the disease than do organic or systemic fungicides at less cost.
5. Tests of different types of knapsack and motorized sprayers have resulted in preliminary recommendations of specific types of equipment for small and medium farms but further in-depth testing of a wider range of equipment is warranted.
6. In the manufacturing of Copper based fungicides by commercial manufacturers, their use of recovered copper increases the level of lead in the fungicide and increases the potential level of lead residues in the coffee bean. Changes in the source of copper for the manufacture of copper oxichlorides and copper oxides are being made and significantly lower levels of lead are now appearing in several commercially available fungicides.

C. Broca Control

This insect first appeared in Central America on the Pacific Coast of Guatemala in 1971. It was not contained and gradually has extended into most of the commercial plantation of coffee in Guatemala, México, El Salvador and Honduras. It is suspected to be also in Nicaragua but no official confirmation has yet been provided by that country.

Broca females penetrate the pulp of green coffee cherries and when the bean has reached a non gelatinous consistency, move into the bean making galleries. They deposit from one to six eggs (the most prolific female produced 117 eggs) which when developed repeat the cycle. The infestation in a field appears to be lowest at or near the first flowering, increasing in population until (about late July) and decrease thereafter. Damaged beans are not acceptable in the export market, increase picking and processing costs and seriously depress yields. Losses on some farms (small holders appear to be the heaviest hit by this insect due to the limited ability of these operators to apply expensive chemicals and use spray equipment) are at times over 50 percent of the crop. The highest infestation in Guatemala have affected from 83-100 percent of the crop. The norm is from 3-20 percent. Damaged coffee beans are not exportable and must be sold for 20-30 percent of the export price if saleable at all.

The projects activities on Broca control have been slow to evolve. The initial senior entomologist left the program after only one year of work in Guatemala - where the PROMECAFE research on this problem is headquartered. In 1985, the IRCC sent a full time senior entomologist to assist the Guatemalan researchers study this pest.

Results of the research to date have:

1. Determined the life cycles, life span and general epidemiology of the insect under local conditions in the major production areas of Guatemala, El Salvador and Honduras.
2. Shown, after screening some 28 insecticides, that "Endosulfín" (Thiodan) is the only economically and chemically effective control material yet available.
3. Determined that the number of applications of Endosulfín can be reduced from four to eight applications of 1.5 to 2.0 kg/ha/application to 0.75-1.0 kg/ha/application in one to three well timed applications.
4. Demonstrated that with proper field sanitation (e.g. removing all late maturing fruit on the trees and picking up all dry fruit and coffee beans on the ground) the level of over-wintering Broca can be significantly reduced and the infestation level the next year can be decreased to a point where, in some years, only one application of Endosulfín is needed.
5. Given some indication that Broca predators exist. Some have recently been introduced into Mexico and at this work may offer another valuable avenue of Broca control in the next decade. A fungus has been found in Guatemala that also attacks Coffee Berry Borer eggs.

C. Residue Analysis and Control/Registration of Pesticides

Most of the larger coffee farms and many of the medium and smaller farms in Central America use a range of chemicals for the control of weeds, diseases and insects that attack coffee. In Costa Rica, the application of chemicals is almost universal for weed control as well as pests. Little work has thus far been done in the region to determine the level of residues in the coffee bean and cup liquor that may prove hazardous to man.

Under the IICA/ROX project initial efforts were made to determine the level of absorption of a number of fungicides and insecticides into the coffee bean. As yet, the studies have not

attempted to detect their presence in the final cup of coffee. ICAITI has performed analysis on some seven of the most important spray compounds used in the region on coffee, as well as their presence in green coffee beans.

The results indicate:

1. Residues of both, two tested fungicides and two insecticides are found in the dry coffee bean. The level seems to vary both with the time of application, the amount used in application and the material applied.
2. The copper based fungicides tested (copper oxychloride and copper oxides) had high levels of lead in their formulation.
3. All of the coffee bean samples taken from treated plots, where copper fungicides (50 percent W.P.) had been applied, resulted in lead residues in the seed (between 0.5 and 0.7 Mg./Kg.).
4. Coffee bean samples taken from untreated plots also showed fairly high lead residues in the bean. These levels were generally lower than when commercial copper based fungicides were applied. The source of lead in coffee beans, untreated coffee is not yet known.
5. Residues of Bayleton (Triademephon), Endosulfán and Malathion were detected in the dried coffee beans. However, as yet, there is no approved maximum tolerance level standard recognized internationally for these chemicals when applied to coffee. Results of the cup analysis of these samples is in progress. It is not possible, as yet, to determine if these residues are still present in the final cup of coffee after roasting.
6. Some of the tested copper based fungicides, commercially sold in the region, have levels of lead in excess of 5000 p.p.m. in their formulations. The present F.A.O. maximum recommended level is 250 p.p.m. As a result of the project research in this area, one company has begun to distribute a lead-free copper fungicide.

D. Plant Improvement

1. Plant Improvement Research

At present, most of the coffee (Coffee Arabica) grown commercially in this hemisphere comes from only a few plants

introduced into the region in the 1700's. Only since the second world war have new high yielding varieties been introduced. These have principally come from Brazil, rust resistant germplasm from the Timor Islands, interspecific crosses from India, several african countries and wild selections from Ethiopia and Liberia. Caturra and Catuaí, Brazilian high yielding semi-dwarf varieties are now widely grown in newer plantations and in replanted older farms. However, these varieties are highly susceptible to coffee rust and other diseases and must be frequently sprayed with fungicides to attain maximum yields.

A number of crosses of Timor Hybrid with Caturra, Catuaí and several C.arabica x C.canephora crosses have been made in Portugal at the International Rust Center as well as in Brazil, Colombia, El Salvador and at CATIE. Some crosses having rust resistance in Brazil have gone through six to eight backcrosses, resulting in the catimor and cavimor varieties. Some lines of these crosses have yielded well for two to four initial crop years and then loose vigor and die or produce very small crops thereafter.

At the beginning of this program, no rust resistant lines yet tested in Central America were as productive as Caturra and Catuaí on a per-area basis. As a result, none could be recommended to producers for commercial exploitation.

The project, from its' inception, placed major emphasis on the introduction of new germplasm for breeding and the regionwide testing of potentially valuable rust resistant crosses under different ecological conditions. Through packaged regional experiments (some 90 plus are now being grown in the participating countries) planted on both farmers fields and on experiment stations, a number of new promising rust resistant lines are being identified. The oldest trials have produced only three crops. It will require at least one more year to make the first selection.

In addition, new crosses made in the region are being sent to Brazil and Portugal to ascertain if in addition to being resistant to Race II of coffee Rust, they may be also resistant to other races of this disease that have not as yet appeared in the PROMECAFE countries. At present, some 426 potentially rust resistant types are being grown in six regional trials, each planted in several locations in each member country of PROMECAFE. Data is being collected on yield/plant, resistance to rust, vigor, plant form, susceptibility to other diseases, etc. At CATIE, the only center in the region with a small sample processing facility (financed under the project), additional data on cherry/dry bean

conversion, bean size and shape, cup quality*, etc are being made.

The results of this extensive regional genetic improvement program have attained some significant preliminary results. Most of the field trials in the countries are not far enough along yet to select truly outstanding types for commercial production. The major findings to date include:

- (a) A number of potentially valuable parent types have been identified with rust resistance and are being used to make new genetic crosses.
- (b) The new crosses show much greater phenotypic heterozygosity than seen in previous breeding programs. This promises a basis for further selection and testing for yield, disease resistance, plant size and possibly cup quality.
- (c) After the first two or three crops (from regional experiments planted in different years) yields of the best rust resistant lines have been more than 50 percent greater than Caturra and/or Catuaí grown in the same experiment.
- (d) Yield of the outstanding individual plants in the best lines are yielding as much as 300 percent more total coffee cherry than per/plant averages for Caturra and Catuaí.
- (e) Where bean size of Caturra and Catuaí is generally smaller than the old arabica types, some of the new have been comparable to or significantly larger than the better old Arabica types.
- (f) A computerized data management software program has been developed to assist national programs record and analyze their data. The magnitude of the data problem facing national researchers participating in this program is easily characterized. In the Honduras program individual plant records are being kept on over 8000 trees on up to eleven different kinds of data per plant. In all, they are hand tabulating some 200,000 values per year, in their plant improvement program alone.

Cup quality relates to the four major cup tastes criteria need in classifying coffee. - Aroma, body, acidity and flavor. It also in the future will consider several industrial concerns in coffee (e.g. cup color, caffeine, content, roast expansion, speed of moisture, absorption, etc.).

14

2. Tissue Culture

Although asexual propagation in coffee has been known and used experimentally for over seventy five years, with few exceptions it has not been used commercially. In C. canephora (commonly called Robusta Coffee) where segregation is very great, asexual propagation has been the only way of increasing elite plants. Also, since many kinds of Robusta are known to be resistant to nematodes, it has been used as a rootstock on which high yielding C. arabica varieties have been grafted (Guatemala). In C. arabica, due to the low level of phenotypic and genetic variability found in Latin-American coffee plantings until recently, asexual propagation, more costly to produce a plant than by seed, has not paid the added expense.

With the new crosses being developed by PROMECAFE, Brazil, Colombia, and the CIFC in Portugal, there is a much greater difference among progenies in yield, bean size and plant form. As a result, a commercially viable method of asexual propagation has been needed to conserve the hybrid vigor of these new selections or some thirty to forty years of backcrossing must be carried out to stabilize the favorable characters in this new gene pool.

PROMECAFE began work in tissue culture to develop a rapid, cheap and effective method of asexual propagation. Although progress was slow in the first several years, it has now made remarkable progress.

The major advances in this area now include:

- a. The development of a micro-cutting propagation technique of orthotropic stems. This procedure can result in about a 10 x multiplication rate every 70-80 days. It appears feasible to make it low cost (almost comparable to seed propagation) and has apparant commercial potential when used in multiplying outstanding rust resistant progeny.
- b. Work has begun on ways to maintain plant material, over time, in-vitro rather than by seed (coffee seed is notorious for not maintaining its germinating capability much beyond six months).
- c. New screening methods are being developed to separate resistant plants in the laboratory - rather than grow them out for two to eight years in the Field -an expensive process.

E. Appropriate Technology and Transfer Methodology

At the initiation of this project, none of the member countries had an effective method of reaching large numbers of small producers. USAID/Honduras soon started a coffee credit and technical assistance project for small producers. However, it centered on a costly one-to-one relationship between the transfer/credit agent and the farmer.

The basic premise of the IICA/ROCAP Program was that if small holders could not sufficiently technify their production to consistently produce at least three hundred weight more coffee per hectare, they would not be able to pay for the added cost of Rust control. Further, that in a few years of total neglect, their plantations would die. Likewise, considering the fact that there were over 200 thousand smallholders in the project area, some other approach to information transfer was needed. One on one technical information exchange was too expensive for national coffee extension services (only about 40-60 farmers could be attended by a full time transfer agent at a cost of \$200.00 U.S. per farmer per year).

During the project period, the following progress has been made:

1. Using a farming system approach, surveys of small farmers in a defined geographic area, have been made in a target department in Honduras and El Salvador to characterize the technical, social and economic situation of small producers.
2. First approximation tech-packs for three levels of small producers, depending upon their access to capital/credit and have been validated in Guatemala.
3. A group approach to technical transfer (Grupos de Amistad y Trabajo -G.A.T.) has been developed and field tested.
4. Some 10-12,000 small farmers are now receiving instruction in the use of the technical packages by G.A.T.S.
5. PROMECAFE has shown that even small holders with almost no access to capital for on-farm investment can increase their production by 100-150 percent in two to three years. Farmers with credit, using the existing technology available, can increase yields by over 400 percent (in some cases over 600 percent) in three years.
6. The per farmer cost of the group transfer methodology is less expensive than one-on-one transfer, without losing efficiency in adoption.

F. Project Coordination and Training

At the outset of PROMECAFE, the collaborating countries recognized that they individually could not solve the many new problems facing the industry and the need for collaboration in using all of their available information and professional capacity more efficiently to improve the income and production of their small and medium sized farm producers. They also recognized that there was a need for increased training of national researchers as well as information transfer personnel at all levels.

In response to these concerns, PROMECAFE has taken the following actions:

1. Coordination

(a) An advisory council has been organized to coordinate the program, set policies and establish activity priorities for the Project.

The council is comprised of the senior coffee program technical officer of each participating country, plus a representative from OIRSA, CATIE, and IICA. This group meets one or more times per year.

(b) Periodic workshops are held to coordinate the work of national subject matter specialists (pathologists, breeders, entomologists, information transfer agents, etc.). They discuss progress and problems and coordinate efforts to attain overall program goals.

(c) As new methodologies and research results are being developed, they are being exchanged and tested in other member countries.

2. Training

From the outset of this regional effort, the Project has placed major attention on training. To date it has:

(a) Sent fifteen national technicians to CIFC in Portugal and the Federal University in Vicosa, Brazil for training in coffee rust epidemiology, and control - both genetic resistance and chemical measures.

In addition, several technicians in the region have been sent to France by the IRCC to study rust pathology (long term training) and one on the biological control of the Coffee Berry Borer (fieldwork in Togo).

(b) Some 146 regional and national short courses, workshops, and seminars have been held. A total of over 500 attendees have participated in one or more these specialized events.

(c) There has been a major improvement among national technicians in understanding modern coffee production, rust and CBB, control, coffee research methods, information transfer methodologies, area sampling etc.

G. Regional Data Network

The project contemplated using the PIADIC/CRIES information and data processing system to record research data from the countries in the project. It also was hoped, that as the program involved, analoging could be used to extrapolate other areas in the region where research success could be applied.

There has been some progress in this area, although it has not progressed as fast as desired. Nevertheless; progress was noted during the Final Evaluation in:

(1) A computer software program for maintaining plant/progeny data has been developed.

(2) Over 6500 technical and research result articles (with their technical summaries) on all phases of coffee production and processing has been developed into a computerized key, word recall system. Copies of this extensive bibliography are being prepared for all participating countries. It will include instructions manuals on its' use and the source of the original publication (IICA, CATIE or other library) if needed by the programs technicians.

H. Extra Regional Assistance

PROMECAFE has been able to attract and use assistance and technical expertise which would not have been possible for each country to secure separately. A short summary of this support includes:

1. The IRCC of France has provided, at its expense, short term technical assistance of four specialists and two long term experts in Tissue Culture and Coffee Berry Borer control research.

2. The ICFC of Portugal has provided training of 15 Central Americans on all phases of rust race identification, rust research methods, control measures, etc., it has also tested crosses made in C.A. to races of the disease not yet found in the region.

3. The Federal University of Vicosa has provided training to PROMECAFE technicians and germplasm resistant to several races of rust for test throughout the region as well as received crosses made in CATIE and ISIC (El Salvador) for test against several races of rust not yet in the region.

4. CENICAFE of Colombia has provided its latest selection for test in regional trials.

5. Several private pesticide companies have provided chemicals for test against coffee rust and CBB.

The Final External Evaluation documents the successes and limitations of the project. It notes "The project has, as yet, not attained all of the goals set forth in the project agreement. It is, at this time, too early to select new superior lines of rust resistant varieties. Work in this area is well advanced and progressing exceedingly well. However, three additional years will be required to begin to see the full potential of this program element. Coffee rust and coffee berry borer (CBB) research has proven that significantly reduced levels of chemical applications and improved plantation sanitation can control these pests at economically feasible costs on small and large farms". However, more study is required to establish the economic control threshold and the best timing of applications.

The success of the program to date, raises additional problems and several very important new researchable potentials. Further progress is also needed in solidifying the research and transfer procedures among countries. Likewise, additional training is needed in research and transfer program management. Further improvement is essential in controlling nutrient deficiencies and modifying cultural practices in the field, in order to gain full income and yield returns from the new varieties, pest control and cultural practices being developed by the project for small producers. More serious efforts are also needed by ROCAP, PROMECAFE and the member countries to secure producer credit so that the new techniques evolving from this program can be utilized more rapidly and effectively by larger number of small producers.

The work done to date has begun to only set the stage for the real changes foreseen for the coffee industry of the region. Its progress has been outstanding. Its potential even greater PROMECAFE and AID/ROCAP have received full value for their contributions to date.

However, "a three to four year extension of this project is proposed in the strongest terms, by this (Final Evaluation) team, in order to solidify the system and allow the progress made to date into efficient farm level recommendations for the region's 250,000 small producers".

PROCUREMENT PLAN

Procurement of goods and services under the Project amendment are identified below followed by a summary table of the estimated cost for each item.

1. Technical Assistance
With the exception of the current Communications Specialist, all long-term technical assistance to be hired will be local staff. IICA will identify and contract the individuals in accordance with its established procedures.
2. Laboratory equipment
Equipment consisting of microscopes, scales, incubators and others will be purchased for control of coffee berry borer, and development and reproduction of rust resistant varieties.
3. Spray equipment
Spray equipment to be purchased includes basically motorized and mechanical pumps. These will be used for rust epidemiology and control, residue analysis and the development and adaptation of appropriate technology activities.
4. Meteorological equipment
Includes thermometers and other equipment used to measure relative humidity. This equipment will be used for the epidemiology and control of rust activity.
5. Sampling Process equipment
This equipment will be used for the development and reproduction of rust resistant varieties basically, and includes scales, thermometers, density measures, trays and others.
6. Audiovisual equipment
Audiovisual equipment for the development and adaptation of appropriate technology will be for training purposes and include a T. V. editor, connection cables and other related equipment.

7. Computers

Two computers including printers will be purchased to manage the data for the development and reproduction of rust resistant materials.

8. Vehicles

Three vehicles will be purchased to replace the old ones that were originally purchased. The proceeds from the sale of the old ones will be used for the purchase of the new ones.

All equipment and materials will be purchased by IICA utilizing procedures of Chapter 3 AID Handbook 11. It is anticipated that source/origin waivers might be required for several items such as: microscopes, scales, portable TV monitors, videocassettes and cameras. Individual waivers will be processed when more detailed specifications are developed.

9. Service Contracts

Two contracts will be signed utilizing the applicable procedures of Chapter 1 of AID Handbook 11, one for the screening of the rust resistant coffee plants with the Coffee Rust International Center in Oeiras, Portugal; and the other with ICAITI in Guatemala for the analysis of the pesticides residues.

The screening of rust resistant plants is essential to the successful implementation of the project and the Coffee Rust International Center in Portugal is the only facility that can provide screening for all known races of rust. According to Paragraphs 5C4 and 5B4 (2) of AID Handbook 1, Supplement B, a waiver of the authorized Geographic Code may be based on the fact that the services are not available from countries included in the authorized Geographic Code (United States and CACM countries). Redelegation of authority 754 authorizes the Mission Director to approve source/origin waivers up to \$5 million per transaction.

The waiver for testing of rust resistance in Portugal, an A.I.D. Geographic Code 899 country, will be included as part of the Project Authorization Amendment. Because Guatemala is a CACM country and is included in the authorized Geographic Code, no waiver for the analysis at ICAITI is required.

TABLE I
PROCUREMENT SCHEDULE

<u>ITEM</u>	<u>TIMEFRAME</u>
I. TECHNICAL ASSISTANCE	
A. Develop scopes of work	2 weeks after PROAG signed
B. Advertise, evaluate and hire	Sept./Nov. '87
C. On board	Jan. '88
1. (1) Jr. Pathologist	Jan. 1988 - Dec. 1990
2. (1) Jr. Entomologist	Jan. 1988 - Dec. 1990

All other personnel will continue from the on-going project.
Short-term consultants will be hired on as needed basis.

II. EQUIPMENT AND MATERIALS

A. Laboratory Equipment ^{1/}	
1. Develop specifications and process necessary waivers	Jan./Feb. '88
2. Advertise	Mar. '88
3. Issue RFQ	Apr. '88
4. Evaluate bids and award contract	June '88
5. Arrival of equipment	Oct./Sept. '88

^{1/} All lab equipment, except the ones for Development and Reproduction of Rust Resistant Varieties which will be ordered once the tissue culture lab facilities have been established.

B. Spray Equipment	
1. Develop specifications and process necessary waivers	Jan./Feb. '88
2. Advertise	Mar. '88
3. Issue RFQ	Apr. '88
4. Evaluate bids and award contract	June '88
5. Arrival of equipment	Oct./Sept. '88
C. Meteorological Equipment	
1. Develop specifications and process necessary waivers	Jun. '88
2. Advertise	Jul. '88
3. Issue RFQ	Aug. '88
4. Evaluate bids and award contract	Sept. '88
5. Arrival of equipment	Dec. '88/Jan. '89

96

- D. Sampling Equipment^{2/}
1. Develop specifications and process necessary waivers Jan. '88
 2. Advertise Feb. '88
 3. Issue RFQ Mar. '88
 4. Evaluate bids and award contract Apr. '88
 5. Arrival of equipment Jul./Aug. '88

^{2/} Most of this equipment will likely be purchased either from Colombia or England, since there is no U. S. manufactured.

- E. Audiovisual Equipment
1. Develop specifications and process necessary waivers Jan. '88
 2. Advertise Feb. '88
 3. Issue RFQ Mar. '88
 4. Evaluate bids and award contract Apr. '88
 5. Arrival of equipment Jul./Aug. '88

- F. Computers
1. Develop specifications Jan. '88
 2. Solicit bids Feb. '88
 3. Evaluate bids and order equipment Mar. '88
 4. Arrival of equipment Apr. '88

- G. Vehicles
1. Develop specifications and process necessary waivers Jul. '88
 2. Advertise Aug. '88
 3. Issue RFQ Sept. '88
 4. Evaluate bids and award contract Oct. '88
 5. Arrival of equipment Jan./Feb. '89

III. SERVICE CONTRACTS

- A. Contract with CIFC in Oeiras, Portugal
1. Negotiate contract Sept. '87
 2. Sign Contract Dec. '87
- B. Contract with ICAITI in Guatemala
1. Negotiate contract Sept. '87
 2. Sign Contract Dec. '87

PROCUREMENT PLAN

<u>I. TECHNICAL ASSISTANCE</u>	<u>ESTIMATED COST</u>
A. <u>Rust Epidemiology & Control</u>	
1. Jr. Pathologist	\$ 66,000
B. <u>Control of Coffee Berry Borer</u>	
1. 1 Jr. Entomologist	60,000
C. <u>Residue Analysis</u>	
1. Field Labor	18,000
D. <u>Development and Reproduction Of Rust Resistant Varieties</u>	
1. 2 M.Sc. Agronomist at \$22,000/yr	132,000
2. Biometrician (6 mos. p/yr at \$750)	13,500
3. 2 Ing. Agrons. at \$10,000/yr	60,000
4. 3 Lab Technicians at \$4,000/yr	36,000
5. 4 Lab Assistants at \$3,000/yr	36,000
6. 10 Field Assistants at \$2,000/yr	66,000
E. <u>Development and Adaptation of Appropriate Technology</u>	
1. Communications Specialist (In- ternational Prof. Personnel)	226,000
F. <u>Technical and Logistic Support</u>	
1. Short-term consultants	<u>117,500</u>
Sub-total T.A.	<u>831,000</u> =====

II. EQUIPMENT AND MATERIALS

A. Laboratory Equipment

1. <u>Control of Coffee Berry Borer</u>	<u>9,000</u>
- 5 Stereoscopic Microscopes (5x\$1,500)	7,500
- 6 Triple Scales (6x\$150)	900
- 12 20X Magnifying glass (12x\$50)	600
2. <u>Development and Reproduction of Rust Resistant Varieties</u>	
<u>Tissue Culture</u>	48,300
- 3 Sterilizers (Autoclaves 3x\$4,000)	12,000
- 3 Laminar Flow Head (3x\$4,000)	12,000
- 3 Means Dispenser (3x\$1,200)	3,600
- 3 PHmeters (3x\$800)	2,400
- 3 Electric Scales (3x\$1,300)	3,900
- 3 Water Distillers (3x\$1,800)	5,400
- 3 18 Ft." Refrigerators (3x\$1,000)	3,000
- 6 Air Conditioners (6x\$1,000)	6,000
<u>Nematode Research</u>	<u>15,000</u>
- Insulating container for transportation of samples	250
- Blender with two recipients	650
- Centrifuge with conic tubes	1,600
- Set of large sieves	600
- Set of small sieves	500
- Counter with 6 units	550
- Manual counters	200
- 2 Microscopes (2x\$2000)	4,000
- Incubator with 2 chambers	6,500
- Dryers	150
Sub-total Laboratory Equipment	<u>72,300</u> =====

B. Spray Equipment for Testing

1. <u>Rust Epidemiology and Control</u>	<u>20,000</u>
-12 Motorized aspersion pumps (12 x\$500)	6,000
-12 Manual Backpack Pumps (12 x\$100)	1,200
-12 Accesories for motorized spray pumps; centrifugal pump, dispersion & spare parts (12x\$200)	3,000
-12 Manual pumps accesories, pressure regulator, set of nozzles and spare parts (12x\$350)	4,200
-6 Kinetic Energy Batteries Equipment (6x\$150)	1,100
-6 Hydraulic Pressure Hose equipment (6x\$400)	2,400
-6 Accesories for Hose Equipment; hoses, nozzles, pressure regulators (6x\$250)	2,100
2. <u>Residue Analysis</u>	<u>3,000</u>
-6 Motorized Spray Pumps (3x\$500)	3,000
3. <u>Development and Adaptation of Appropriate Technology</u>	<u>3,000</u>
-4 Motorized spray pumps (4x\$500)	2,000
-10 Manual Backpack pumps (10x\$100)	1,000
Sub-total Spray Equipment	<u>26,000</u> =====

C. Meteorological Equipment

1. <u>Rust Epidemiology and Control</u>	
-4 Rain gauge, Clear Vu (4x\$50)	200
-2 Bendix Hicrothermograph (2x\$1000)	2,000
-2 Maximum and minimum thermometer (2x\$250)	500
-2 Hicrothermograph for relative humidity (2x\$100)	200
-2 Anemometer (2x\$2150)	4,300
-2 Evaporation engraver (2x\$600)	1,200
-2 Piranometer (2x\$900)	1,800
-2 Humidity leaves measurer (2x\$900)	1,800
Sub-total	<u>12,000</u> =====

D. Equipment for Sample Process

1. Development and Reproduction of Rust Resistant Varieties

-5 Seed humidity measurer (5x\$270)	1,350
-5 Energy converter for humidity measurer (5x\$50)	250
-5 Scale (5x\$100)	500
-10 Maximum and minimum thermometer (10x\$80)	800
-5 Electric adding machine (5x\$250)	1,250
-5 Samples homogenizer (5x\$650)	3,250
-5 Plastic bag sealer with accesories (5x\$400)	2,000
-5 Lamp with magnifier glass (5x\$160)	800
-5 Density measurer (5x\$150)	750
-10 Aluminum trays (10x\$80)	800
-5 Sieve set for classification of seed sizes (5x\$160)	800
-5 Vibrator for sieves (5x\$500)	2,500
-5 Thrashing machine (5x\$700)	3,500
-5 Clock hygrometer (5x\$100)	500
-5 Electronic eye to detect bean anormalities (5x\$190)	950
	<hr/>
Sub-total	20,000
	<hr/> <hr/>

E. Audiovisual Equipment

1. Development and Adaptation of Appropriate Technology

T.V. editor	4,500
Automatic edition control	1,600
Connection cables for editor and edition control	300
Portable monitor	700
-2 Two lamps, cables, bulbs, tripe filters and case	700
Quartz bulbs, 1000 w	200
Video (Betamax or VHS)	1,000
-5 Tape recorder with automatic synchronization (5x\$500)	2,500
-5 Slide projector with zoom lens and accessories (5x\$340)	1,700

-5 Retroprojector (5x\$700)	3,500
-5 Tripod projection screen (5x\$100)	500
-3 Camera and accessories (3x\$600)	1,800
-10 Megaphones (10x\$100)	1,000
	<hr/>
Sub-total	20,000
	<hr/> <hr/>

F. Computers

1. Development and Reproduction
of Rust Resistant Varieties

-2 Personal Computers 256 KB Ram, 360 KB diskette drive, 10 MB hard disk (2x\$3000)	6,000
-2 Printers for Personal Computer (2x\$500)	1,000
	<hr/>
Sub-total	7,000
	<hr/> <hr/>

G. Replacement of Vehicles

One for Broca, one for Rust and
one for technology transfer activities

-3 All road vehicles, Blazer type or
similar, manual transmission, 4-cylinders,
gasoline engine (3x\$3000)

Sub-total	9,000
	<hr/> <hr/>

Total Equipment and Materials	166,300
	<hr/> <hr/>



II. SERVICE CONTRACTS

A.	<u>Coffee Rust Resistance Testing</u>	
1.	Contract with CIFC - Oeiras, Portugal	15,000
B.	<u>Analysis of Pesticides Residue</u>	
1.	Contract with ICAITI, Guatemala	<u>55,000</u>
	Sub-total	<u>70,000</u>
		=====
	TOTAL PROCUREMENT	<u>\$1,067,300</u>
		=====

2854j

69

DETAILED ACTIVITY BUDGET
(AID CONTRIBUTION)

TECHNICAL AND LOGISTIC SUPPORT

figures in US Dollars (rounded)

CATEGORIES	YEAR 1	YEAR 2	YEAR 3	TOTAL
1. Int'l Prof. Personnel.				
2. Local & Gral. Servs. Pers.				
3. Scholarship & Training.	4,000	4,000	4,000	12,000
A. Study and Observation Trips. 15 trips x \$250 + 3 days x \$90	4,000	4,000	4,000	12,000
4. Travel & Per Diem.	14,200	14,200	14,200	42,600
A. 9 trips x \$400 + 6 days x \$90	8,500	8,500	8,500	25,500
B. tech. coordination meeting 4 trips x \$300 + 2 days x \$90 x 3 meetings + local personnel	5,700	5,700	5,700	17,100
5. Documents & Materials.	9,000	9,000	9,000	27,000
A. Stationery and Photocopies	9,000	9,000	9,000	27,000
6. Prop, Facs. & Equipment.	1,000	1,000	1,000	3,000
A. Replacement of Office Equipment	1,000	1,000	1,000	3,000
7. Maint., Coon. & Gral. Servs.	7,000	7,000	7,000	21,000
A. Telephone, Mail, Gasoline, etc.	5,000	5,000	5,000	15,000
B. Repair and maint. of Office Equip.	2,000	2,000	2,000	6,000
8. Contracts.	30,500	23,000	60,500	114,000
A. Greenhouse Spec. 0.5 m/p	2,500			2,500
B. Editor Spec. 3 m/p			7,500	7,500
C. System Analyst 3 m/p \$1200 p.a.	3,600			3,600
D. Library Spec. 1 m/p	1,400			1,400
E. Other Spec. as Required 2 m/p \$2500 (total 6 m/p)	5,000	5,000	5,000	15,000
F. Advisory Comm. Meeting	15,000	15,000	15,000	45,000
G. Final Evaluation & External Audits	3,000	3,000	33,000	39,000
9. Others Costs.	20,000	16,000	16,000	52,000
A. Computer Use: Account & Manag. Reports.	8,000	8,000	8,000	24,000
B. Vehic. Ins., Customs, Licences.	12,000	8,000	8,000	28,000
TOTAL	85,700	74,200	111,700	271,600

TABLE B.3
REGIONAL COFFEE PEST CONTROL

DETAILED ACTIVITY BUDGET
(AID CONTRIBUTION)

RUST EPIDEMIOLOGY AND CONTROL

figures in US Dollars (rounded)

CATEGORIES	YEAR 1	YEAR 2	YEAR 3	TOTAL
1. Int'l Prof. Personnel.				
2. Local & Gral. Servs. Pers.	22,000	22,000	22,000	66,000
A. Jr. Pathologist	22,000	22,000	22,000	66,000
3. Scholarship & Training.	26,000	6,000	6,000	38,000
A. 2 persons (spray equipm. course England, 3 months)	20,000			20,000
B. Reg. Rust Research Coord. Workshop, 2 days	3,000	3,000	3,000	9,000
C. Thesis Research Training 2 people/year	3,000	3,000	3,000	9,000
4. Travel & Per Diem.	5,600	5,600	5,600	16,800
A. 6 trips x \$400 + 6 days x \$90	5,600	5,600	5,600	16,800
5. Documents & Materials.	5,000	5,000	5,000	15,000
A. Research Supp. (Fert., Pest Cont. Chem.)	5,000	5,000	5,000	15,000
6. Prop, Facs. & Equipment.	28,000	4,000	3,000	35,000
A. Test instruments	20,000			20,000
B. Replace Vehicle (El Salvador)	3,000			3,000
C. Research (Meteorological) Equip.	5,000	4,000	3,000	12,000
7. Maint., Comm. & Gral. Servs.	4,000	6,000	6,000	16,000
A. Maintenance of Vehicle	2,000	3,000	3,000	8,000
B. Communications (teleph., telex, etc.)	1,000	1,000	1,000	3,000
C. Maintenance of Spray Equip.	1,000	2,000	2,000	5,000
8. Contracts.	3,500			3,500
A. Rust Specialist (0.5 m/p)	3,500			3,500
9. Others Costs.				
TOTAL	94,100	48,600	47,600	190,300

TABLE B.4
REGIONAL COFFEE PEST CONTROLDETAILED ACTIVITY BUDGET
(AID CONTRIBUTION)

CONTROL OF BROCA

Figures in US Dollars (rounded)

CATEGORIES	YEAR 1	YEAR 2	YEAR 3	TOTAL
1. Int'l Prof. Personnel.				
2. Local & Gral. Servs. Pers.	20,000	20,000	20,000	60,000
A. Jr. Entomologist	20,000	20,000	20,000	60,000
3. Scholarship & Training.	3,500	3,500	3,500	10,500
A. Thesis Research Training (1 per./yr.)	3,500	3,500	3,500	10,500
4. Travel & Per Diem.	5,600	5,600	5,600	16,800
A. 6 trips x \$400 + 6 days x \$90	5,600	5,600	5,600	16,800
5. Documents & Materials.	4,000	4,000	4,000	12,000
A. Research Mat. (Fert., Pest Cont. Chem.)	4,000	4,000	4,000	12,000
6. Prop, Facs. & Equipment.	6,000	3,000	3,000	12,000
A. Replace Vehicle (Guatemala)	3,000			3,000
B. Research (Lab.) Equip.	3,000	3,000	3,000	9,000
7. Maint., Comm. & Gral. Servs.	3,000	4,000	4,000	11,000
A. Vehicle Maintenance	2,000	3,000	3,000	8,000
B. Communications (teleph., telex, etc.)	1,000	1,000	1,000	3,000
8. Contracts.	3,500			3,500
A. Broca Specialist 0.5 m/p	3,500			3,500
9. Others Costs.				
TOTAL	45,600	40,100	40,100	125,800

DETAILED ACTIVITY BUDGET
(AID CONTRIBUTION)

RESIDUE ANALYSIS

figures in US Dollars (rounded)

CATEGORIES	YEAR 1	YEAR 2	YEAR 3	TOTAL
1. Int'l Prof. Personnel.				
2. Local & Gral. Servs. Pers.	6,000	6,000	6,000	18,000
A. Field Labor (\$2000, Guat. Salv. Hond.)	6,000	6,000	6,000	18,000
3. Scholarship & Training.				
4. Travel & Per Diem.	2,800	2,800	2,800	8,400
A. 5 trips x \$300 + 3 days x \$90	2,800	2,800	2,800	8,400
5. Documents & Materials.	2,000	2,000	1,000	5,000
A. Chemicals and supplies	2,000	2,000	1,000	5,000
6. Prop, Facs. & Equipment.	3,000	0		3,000
A. Spray Equip.: 6 Backpack \$500 ea	3,000			3,000
7. Maint., Comm. & Gral. Servs.				
B. Contracts.	22,500	20,000	24,500	67,000
A. Residue Pest Spec. (Work Eval.) 0.5 m/p	3,000			3,000
B. Residue Pest Spec. (Experim. Design) 0.5 m/p	4,500			4,500
C. Residue Pest Spec. (Interp. of Result.) 0.5 m/p			4,500	4,500
D. Analysis of Samples	15,000	20,000	20,000	55,000
9. Others Costs.				
TOTAL	36,300	30,800	34,300	101,400

TABLE B.6
REGIONAL COFFEE PEST CONTROL

DETAILED ACTIVITY BUDGET
(AID CONTRIBUTION)

DEVELOPMENT AND REPRODUCTION OF RUST RESISTANT VARIETIES

figures in US Dollars (rounded)

CATEGORIES	YEAR 1	YEAR 2	YEAR 3	TOTAL
1. Int'l Prof. Personnel.				
2. Local & Gral. Servs. Pers.	114,500	114,500	114,500	343,500
A. 2 Msc. Agronomist (Sal & Benf. \$22000 e.)	44,000	44,000	44,000	132,000
B. Biometrician (1/2 Time, \$750/m.)	4,500	4,500	4,500	13,500
C. 2 Eng. Agrons., \$10000 /yr.)	20,000	20,000	20,000	60,000
D. 3 Lab Technicians \$4000/yr.	12,000	12,000	12,000	36,000
E. 4 Lab Assistants, \$3000/ yr.	12,000	12,000	12,000	36,000
F. 10 Field Assistants, \$2200/yr.	22,000	22,000	22,000	66,000
3. Scholarship & Training.				
4. Travel & Per Diem.	7,500	7,500	7,500	22,500
A. 6 Trips x \$400 x 4 days x \$90	7,500	7,500	7,500	22,500
4 Trips x \$300 x 5 days x \$90				
5. Documents & Materials.	18,300	31,700	22,800	72,800
A. Supplies and Chem. for Labs.	13,300	26,700	17,800	57,800
B. Fert. and Pest Control Chem.	5,000	5,000	5,000	15,000
6. Prop, Facs. & Equipment.	49,600	50,700		100,300
A. Remod. of Tissue Lab.	10,000			10,000
B. Equip for Commercial Tissue Labs. (3 Labs at \$16100, Guat, Salv, Hond)	16,100	32,200		48,300
C. Equip. for Sample Process Plant (5 Sets-Pulper, Bean Class, etc.)	10,000	10,000		20,000
D. Equip. for Nematode Research	10,000	5,000		15,000
E. 2 PComputer \$3500 (Guat, Panama)	3,500	3,500		7,000
7. Maint., Comm. & Gral. Servs.	7,000	9,000	10,000	26,000
A. Maintenance of Vehic. & Motorcycles	2,000	3,000	3,000	8,000
B. Main. of Labs. & Computer Equip.	5,000	6,000	7,000	18,000
8. Contracts.	22,000	6,000	13,000	41,000
A. Genetic Spec. 2 m/p (total 4 m/p)	12,000		13,000	25,000
B. Data Processing Spec. 1 m/p (total 2 m/p)	3,000	6,000		11,000
C. Nematode Spec. 1 m/p	5,000			5,000
9. Others Costs.	3,000	3,000	3,000	9,000
A. Computer Time (Thesis Research)	3,000	3,000	3,000	9,000
TOTAL	221,900	222,400	170,800	615,100

TABLE B.7
REGIONAL COFFEE PEST CONTROLDETAILED ACTIVITY BUDGET
(AID CONTRIBUTION)

DEVELOPMENT AND ADAPTATION OF APPROPRIATE TECHNOLOGY

figures in US Dollars (rounded)

CATEGORIES	YEAR 1	YEAR 2	YEAR 3	TOTAL
1. Int'l Prof. Personnel.	71,000	74,000	81,000	226,000
A. Extension Spec. (Sal & Ben)	71,000	74,000	81,000	226,000
2. Local & Gral. Servs. Pers.				
3. Scholarship & Training.	190,000	140,000		330,000
A. 2 Reg. Courses on Transfer Method (2 Weeks)	20,000	20,000		40,000
B. 2 Reg. Workshops on Validation (2 Weeks)	15,000	15,000		30,000
C. 2 Reg. Workshops on Audiovisual Mats. (2 Weeks)	15,000	15,000		30,000
D. 1 Reg. Workshop on Residues (2 Weeks)		10,000		10,000
E. 2 Reg. Courses on Tissue Cult. (3 Mos. ea)	20,000	20,000		40,000
F. 1 Reg. Workshop on Rust (2 Weeks ea)	20,000			20,000
G. 2 Reg. Workshops on Coffee Prod. Met. (2 Weeks)	20,000	20,000		40,000
H. 2 Reg. Workshops on Coffee Nut. (2 Weeks)	15,000	15,000		30,000
I. 1 Reg. Workshop on Data Processing (2 Weeks)	20,000			20,000
J. 1 Reg. Workshop on Cont. Bean Borer (2 Weeks)	20,000			20,000
K. 2 Nat. Courses on Transf. Meth. (2 Weeks)	10,000	10,000		20,000
L. 2 Nat. Courses on Area Characteriz. (2 Weeks)	10,000	10,000		20,000
M. Library Training	5,000	5,000		10,000
4. Travel & Per Diem.	8,100	8,100	8,100	24,300
A. 8 Trips x \$300 + 4 days x \$90 3 Trips x \$400 + 6 days x \$90	8,100	8,100	8,100	24,300
5. Documents & Materials.	28,000	28,000	28,000	84,000
A. Training Mats. (Photocop, Tech. Books)	7,000	7,000	7,000	21,000
B. Bulletins and Pamphlets	8,000	8,000	8,000	24,000
C. Visual Aids	5,000	5,000	5,000	15,000
D. Mass Media Materials (Recording Tape)	4,000	4,000	4,000	12,000
E. Chemicals for Demonstration Plots	4,000	4,000	4,000	12,000
6. Prop, Facs. & Equipment.	16,000	5,000	5,000	26,000
A. Audiovisual Equipment	10,000	5,000	5,000	20,000
B. Replace Vehicle (Hond.)	3,000			3,000
C. Sprayers: 10 Knapsacks \$100 ea. 4 Backpacks \$500 ea.	3,000			3,000
7. Maint., Comm. & Gral. Servs.	2,000	3,000	3,000	8,000
A. Vehicle Maintenance	2,000	3,000	3,000	8,000
B. Contracts.	3,500			3,500
A. Mass Media Spec. 1 m/p	3,500			3,500
9. Others Costs.				
TOTAL	318,600	258,100	125,100	701,800

IMPLEMENTATION SCHEDULE

ACTION ELEMENT	Q U A R T E R S											
	1988				1989				1990			
	1	2	3	4	1	2	3	4	1	2	3	4
1. Biological Properties of Rust												
- Increase the regional Adaptation and use of new Rust Control Procedures:												
a. Strengthening the coord and use of research (Workshop)												
b. Conducting one regional short course on spray control			—				—					—
c. Workshop on epidemiology and Control of Rust			—				—					—
d. Publishing research results	—				—				—			
e. Prepare five radio programs		—				—				—		
			—	—	—	—	—			—		
- Test spray equipment for small farms												
a. 2 Salv. students/England												
b. Test ten sprayers	—											
c. Publish two bulletins on Equip.				—	—	—	—	—	—	—	—	—
d. Nat. Workshops Rust Cont. Methods					—				—			
	—							—				
- Refine research on Rust Control & Epidemiology by:												
a. 3 studies on Econ. of Chem Rust Control												
b. Index method for rust incidence	—				—			—		—		—
c. Workshop on new Rust Res.							—		—			
d. 6 M.Sc. Thesis										—	—	

efk

ACTION ELEMENT	Q U A R T E R S											
	1988				1989				1990			
	1	2	3	4	1	2	3	4	1	2	3	4
2. CONTROL OF COFFEE BERRY BORER												
- Test new control measures for Broca on large scale												
- Develop producer recommend.												
a. Two tech. Bulletins												
b. Hold Reg. Workshop on Broca Control												
c. Prepare audio visual mats.												
d. Measures econ. of Broca control												
- Research on Threshold for improved Broca Control												
a. Measure effect of Cont. timing												
b. Measure loss of Prod.												
c. Evaluate cult. pract. on Broca												
- Test alt. insecticide for Broca Control												
a. Develop lab. proceed.												
b. Test 20 materials												
c. Field test the Best												
d. Publish results												
- Eval. Broca Resist in other coffee types												
a. Review literature												
b. Test 20 materials (lab)												
c. Make crosses to Rust resist. materials												
3. RESIDUE ANALYSIS												
- Review Analytic Procedures												
a. Review lab. methods												
b. Change proceed. if necess.												

ACTION ELEMENT	Q U A R T E R S											
	1988				1989				1990			
	1	2	3	4	1	2	3	4	1	2	3	4
- Review field Expt. Methods												
a. Review field res. methods												
b. Make changes as required												
- Conduct field residue trials for spray metals												
a. Analyze pesticides for heavy metals												
b. Conduct field expts.												
c. Collect coffer samples												
d. Analyze samples												
e. Analyze result												
f. Publish findings												
- Analyze coffee for Pesticide and weedkiller residues												
a. Conduct field trials												
b. Analyze samples												
c. Evaluate results												
d. Publish findings												
- Recommend changes in Pesticide Controls/Regulations to countries												
a. Hold workshop-residues												
b. Publish recommendations to countries with OIRSA												
4. DEVELOPMENT & REPRODUCTION OF RESISTANT VARIETIES												
- Train nat techs. on cofee improvement & reproduction												
a. Conduct 2 reg. courses on asexual propagation												
b. In-service training 6 C.A. Techs.												
c. Eval. & Followp												
d. Publish on large scale micro-cutting prod. method.												

99

ACTION ELEMENT	Q U A R T E R S											
	1988				1989				1990			
	1	2	3	4	1	2	3	4	1	2	3	4
5. DEVELOPMENT AND ADAPTATION OF APPROPRIATE TECHNOLOGY												
- Expand G.A.T. & Mass Media info Transfer Methodologies												
a. Propose publication on G.A.T. Methodology												
b. Hold 2 Reg. Courses in transfer methods												
c. Hold 2 nat. courses in transfer methods												
d. 2 workshops on area characterization												
e. 2 Reg. workshop on valid research results												
f. 2 Reg. courses - audio visual transfer												
g. Prepare & Dist. 5000 publ. to small farmers per each five countries												
h. Prepare and use/audio-visual materials in countries												
i. Provide followup to nat. program.												
- Conduct workshops/seminars for nat. techs. on Prog. results												
a. One WS. on research Anal.												
b. 2 Reg. WS. micro-cut. method.												
c. 1 Reg. course-rust cont.												
d. 1 Reg. WS - CBB cont.												
e. 2 Reg. WS - modern coffee prod.												
f. 2 Reg. WS - lab. coffee nutrition analysis												
g. 1 Reg. WS - data processing												
h. In-service train. 3 people library methods												
i. Training new biblio. in ongoing courses												
j. Followup T.A. course participants												

ACTION ELEMENT	Q U A R T E R S											
	1988				1989				1990			
	1	2	3	4	1	2	3	4	1	2	3	4

6. TECHNICAL & LOGISTICS SUPPORT

- a. Hold quarterly coord. meeting
- b. Hold annual Tech. Adv. Council Meeting
- c. Visit nat. progrs.
- d. Negotiate contributions to program
- e. Prepare annual report

-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Annex G

Project No. 596-0090

LAC/DR IEE No. 87- 37

Page 1 of 9

INITIAL ENVIRONMENTAL EXAMINATION

Project Country: Central America and Panama Regional (CA/P)

Project Title and Number : Regional Coffee Pest Control Amendment
(596-0090)

Life of Project : Three Years (FY'88-90)

Funding: \$2.5 million (Grant)

IEE Prepared by : Frank Zadroga, REMS/ROCAP *Frank Zadroga*

Date : 8/28/87

Recommended Threshold Decision : Negative Determination based on the
implementation of mitigative measures
established in this IEE.

Approval:

James S. Hester . SEP 25 1987
James S. Hester date
Chief Environmental Office
LAC/DR

103

Annex G

Project No. 596-0090

LAC/DR IEE No. 87-

Page 2 of 9

INITIAL ENVIRONMENTAL EXAMINATION

Project Country : Central America and Panama Regional
(CA/P)

Project Title and Number : Regional Coffee Pest Control Amendment
(596-0090)

Life of Project : Three years (FY-1988-90)

IEE Prepared by : Frank Zadroga REMS/ROCAP *Frank Zadroga*

Funding : \$2.5 million (Grant)

Date : 8/28/87

Recommended Threshold : Negative Determination based on the
implementation of mitigative measures
established in this IEE.

Concurrence : *Nadine Hogan*
Nadine Hogan
Director, ROCAP

Date 8/28/87

I. Background

This project amendment continues the original five year Regional Coffee Pest Control Project signed between ROCAP and IICA in June, 1981, with an extended PACD to December 31, 1987. For the original project, an IEE was developed and a negative determination approved. No change is proposed in this amendment to the goal, purpose and major components/activities of the original project. The environmental analysis and justification for the overall project will be updated in this IEE. Commentary will focus on the design changes that result from the amendment, their potential environmental consequences and necessary mitigative measures.

II. Project Description

In the past decade, coffee pests (particularly rust) new to the region have occurred and spread in Central America. These pests pose a severe threat to the region because coffee is a major export commodity and, if left unchecked, could cause production to fall significantly. Research on the problem has been underway in various regional and national institutions, but human as well as financial resources have been limited. Technologies (such as higher plant densities, different uses of shade, fertilizer and water, and spraying) have been developed which can help to reduce the impact of rust and other diseases. In addition, the initial Regional Coffee Pest Control project has contributed significantly in terms of providing training, plant improvement and propagation, and techniques for coffee pest control. However, more research and the transfer of findings are needed if the problem is to be kept under control in Central America.

The project is designed to develop an integrated system to help combat the spread of coffee rust and other pests, particularly as they affect the small farmer. The project will work with regional and national level institutions to expand and accelerate research and the development, adaptation and transfer of technologies which will be of particular benefit to the small farmer. Research will be one of two main project activities and will continue to focus on (1) the development and reproduction of resistant varieties of coffee plants; (2) biological properties of rust; (3) properties of coffee berry borer and methods of control; (4) use and control/registration of pesticides and analysis of residue; and (5) development/adaptation of appropriate technologies for small farmer production of coffee. The second main project activity will be technology transfer. The amendment will focus continued research on rust resistant varieties, control methods of coffee bean borer, and pesticide residue analysis, along with improving the transfer of information, methodologies, germplasm, and new technologies developed under the project. Additional activities include training of technicians from both regional and national level institutions, the expansion of a data bank containing information relevant to coffee production, and technical and logistical support. The major outputs of the project will be the results of each of the research activities and their adaptation and acceptance throughout Central America.

10/82

III. Project Area

The project will be implemented by the regional research institutions (IICA, CATIE, IRCC and ICAITI) concerned with the control of coffee diseases. Research will be conducted under controlled conditions at the experiment stations of the participating institutions. Field testing will be conducted in the mountainous coffee producing regions of Central America where there are over 200,000 small coffee producers.

In Central America, coffee is produced in regions ranging from 100 meters to over 1,600 meters in altitude, but most commonly around 1,000 meters. Topography is mountainous with broken hills and slopes in the range of 15 to 35 degrees. Soils are generally volcanic (inceptisoles) or lateritic, with clay-silt or clay-sand textures, varying in depth of topsoil from several inches to several feet and varying in permeability and resistance to erosion. There is very little irrigation of small coffee plantations. Small coffee production is generally in forest lands, and in regions where deforestation and resultant erosion are frequent in the absence of coffee.

IV. Environmental Consequences

A. Direct Environmental Impacts

The project consists of research activities which will lead to improved control of coffee pests, particularly rust and coffee bean borer. Research will be carried out under controlled experimentation in laboratories and experiment stations and, as such, is not expected to have any significant direct impact on the environment.

The project will include research involving the use of pesticides to control coffee diseases. However, the research will be oriented towards determining the most appropriate use of the pesticides and developing regulations to standardize their use. This research will also examine how the environment is affected by the pesticides with the results incorporated into the standardization regulations. Pesticide residues in the bean and in the agroecosystem will be analyzed and control practices optimized accordingly.

In addition, this activity will develop a system for registration of pesticides and chemical agents in the countries in order to have more effective control of their use. The use or application of pesticides under the research component of the project will be conducted under strict control to safeguard the health of research personnel and the ultimate user of the regulations developed, as well as the quality of the local environment.

B. Indirect Environmental Impacts

Since the project is designed to control coffee diseases and make new technologies and improved plant varieties available to help with their

ANNEX G

Project No. 596-0090

LAC/DR IEE No. 87- _____

Page 5 of 9

control, it is expected that the project will have a positive environmental impact over the long run. As part of the project, existing chemical and management technologies such as plant density and use of shade, will be adapted to fit the small farmer environment and are expected to help increase production. Another technology which, when implemented by small farmers, will produce a positive environmental effect is an improved planting system which employs land conservation techniques. The extent to which these technologies are accepted by the small farmers will dictate the extent of the indirect positive environmental impact.

V. Discussion of Impacts

A. The project is designed to strengthen institutional research, to develop resistant varieties, and to establish the mechanisms for standardization of pesticide regulations used to control plant diseases. In developing standards which conform with USEPA and/or FAO/WHO norms, the project will have a significant beneficial impact in reducing pesticide poisoning, environmental pollution, and food contamination, which are serious problems in the region. The development of resistant varieties, in time, will have a significant impact in reducing dependence on pesticides for the control of coffee rust and other pests.

B. The control of coffee rust with pesticides will undoubtedly affect water quality since most of the coffee in the region is grown at elevations of 2000 to 5000 feet. Pesticides used at those altitudes will find their way into rivers, streams and perhaps aquifers. Moreover, they will contaminate surface water and perhaps groundwaters. The use of coffee fungicides in rust control will have a minor impact on water quality since copper fungicides are rapidly absorbed in the soil; however, use of other pesticides that readily leach through the soil may have a greater negative impact. Coffee bean borer control research will evaluate 20 or more pesticides to find alternatives to the use of endosulfan and to discover chemical control practices with the least economic, human health and environmental costs. Therefore, the project objective of uniform pesticide registration and standardization of regulations will have a moderate beneficial impact on water quality. Environmental impact analysis will allow the project to select technologies for transfer with minimum environmental risk and to promote improved integrated pest management practices throughout the region.

C. The achievement of project objectives will have a moderate impact on the improvement of Central American health conditions. Specifically, it will contribute to a reduction in pesticide contamination of foods and water. At present, a large number of the food products consumed in the region are contaminated with pesticides because of indiscriminate sales and use. Such contamination in many instances exceeds accepted tolerances as established by the USEPA and FAO/WHO. A uniform regulation for pesticide use in accordance with standards established by FAO/WHO and/or USEPA will significantly reduce these problems. Helping the small farmer cope with coffee rust and developing

137

technological packages to help him modernize his farming operations, will increase his standard of living by providing resources for a more balanced diet.

D. To cope with coffee rust, as an immediate effort, agricultural pesticides must be introduced in areas where their use was not required in the past. Agricultural chemicals improperly used will have an adverse effect on production and in time will be detrimental to man and the environment. However, the effect of coffee rust left unchecked will be devastating on the economy and the livelihood of the small producer. Ideally, resistant varieties provide the best means to cope with the problem; unfortunately there is no proven commercial variety that can be used in this emergency on a commercial scale. The safeguards that will be incorporated in the technological packages for small producers, dealing with safe use of pesticides, will help minimize such problems. The program of pesticide registration, dealing with experimental field testing, will be under the guidance and supervision of competent scientists and will not require further environmental examination.

E. To increase coffee production in the region basically two options exist: to intensify coffee production from existing plantations and/or to develop new areas. The strategy promoted by this project is the intensification and use of improved technology on existing plantations/acreages. In transferring cultural practices and promoting coffee production at the national level, the potential exists for partial or total cutting of tropical forests for coffee plantation establishment. Coffee can be grown either under partial shade or with full sunlight, and plantation establishment in natural forest areas would require cutting of understory vegetation and probably a thinning of the overstory canopy. Preferred alternatives to natural forest cutting exist since coffee can be established in secondary forests or as completely artificial plantations together with shade trees on cleared lands. Although coffee plantations retain a protective tree/vegetative cover, the loss of native plants and animal species and a consequent reduction in the biological diversity of the site is inevitable when natural forest is affected. This impact is greatly reduced when coffee plantations are established in secondary forest areas or on cleared lands.

Although improper cultural practices could lead to soil erosion, especially from weeding and access roads and trails, the tree crop/agroforestry nature of coffee plantations, when these are properly managed, is protective against soil erosion.

F. Indirect Environmental Consequences:

Since the project is designed to promote coffee planting by small and medium sized farmers as well as to control coffee diseases and make new technologies and improved plant varieties available to help with production and disease control, it is expected that the project will have a net positive

178

environmental impact over the long run. Coffee is a tree crop and, if properly managed and located, is sustainable. As part of the project, existing chemical and cultural practices, such as plant density and the use of shade, will be adapted to fit the small farmer enterprise and are expected to help increase production and welfare. Also with shaded coffee, a productive agroforestry system will be established - an agroecosystem that environmentally is much more desirable than many alternative tropical land uses (i.e. annual crops, grazing). The extent to which these technologies are accepted by the small farmers will dictate the extent of the indirect positive environmental impact.

VI. Conclusions and Recommendations

From the above discussion, it is determined that the project will not have a significant negative effect on the environment if the appropriate mitigative measures indicated in this IEE are carried out. The application of project results will help to control the spread of coffee pests, particularly rust, and provide the small farmer with the technologies which will permit an increase in production to be accomplished in an environmentally sound manner.

Research Activities

The research applications and limited field testing to be carried out under the project qualify for a categorical exclusion per AID Environmental Procedures Sections 216.2(c)(1)(iii) and 216.2(c)(2)(ii). Likewise, the procurement and use of pesticides for research or limited field evaluation/trials by or under the supervision of the specialized project personnel of IICA, CATIE, IRCC and ICAITI qualify as an exception to the pesticide procedures per section 216.3(b)(2)(iii).

Infrastructure Development

No infrastructure development will be funded by the project. Infrastructure development funds will be used for equipping semi-commercial tissue culture and small coffee processing facilities and training their personnel. The costs associated with building construction land and staffing of these facilities (several of which already exist) will be covered by the participating countries.

Cultural practices

The Regional Coffee Pest Control Project will increase the production of coffee in the CA/P region. Although it is not the intent of the project to promote the establishment of new coffee plantations at the expense of natural tropical forests, through project technology transfer actions in participating countries this possibility exists. In accordance with FAA Section 118 legislation on the conservation of tropical forests (as revised on October 3, 1986), AID is required to deny assistance to activities that would

unnecessarily result in the conversion of tropical forest lands. Accordingly, the PROMECAFE project should covenant to do everything within the power and scope of the project to prevent the conversion of tropical forests to establish coffee plantations. Furthermore, the project should actively promote the intensification and application of improved technologies on existing plantations.

Technology Transfer

Specific coffee pest control and production technologies will be transferred to the CA/P countries via training, publications, extension materials and extensive field trials/applications. Technologies will be applied in the field by both technicians and extension agents as well as through the GATS (Grupos de Amistad y Trabajo) at the national level in cooperation with national coffee institutions.

Since specific production and pest control technologies will be applied by non-project personnel, including cultural practices, pesticides and improved plant materials, the potential exists for significant environmental and human health impacts, especially resulting from pesticides. Pesticides could be transported through or stored in agroecosystems in various forms and ways, including in soils, in water (via runoff or groundwater) and in non-target organisms (plants and animals) and could create downstream impacts or foodchain risks to humans and other organisms. Pesticide residues could also occur in coffee beans and lead to export/marketing and quality control problems. Discharge of coffee mill wastes into streams and rivers, as currently practiced, creates serious water contamination (perhaps the water contaminant of greatest impact in Central America). Technology to mitigate this impact exists and could be promoted as part of a larger PROMECAFE technological package.

VII. Mitigative Measures

A. Regarding pesticide procurement and use for research applications, section 216.3(b)(2)(iii) applies and IICA therefore covenants to ensure that the manufacturers of the pesticides to be used provide toxicological and environmental data necessary to safeguard the health of research personnel and the quality of the local environment in which the pesticides will be used. Furthermore, treated crops will not be used for human or animal consumption unless appropriate tolerances have been established by EPA or recommended by FAO/WHO, and the rates and frequency of application, together with the prescribed preharvest intervals, do not result in residues exceeding such tolerances. This prohibition does not apply to the feeding of such crops to animals for research purposes.

B. Potential exists for significant environmental impact resulting from the technology transfer component of the project. Therefore, as part of the ProAg, the project will agree as a condition precedent to carry out the

appropriate environmental analysis, according to AID Environmental Procedures 22 CFR Part 216 and its section 216.3(b) specifically referring to pesticide procedures and FAA section 118 regarding to the protection of tropical forests, for all technological packages for coffee production and pest control. Regarding pesticide use/procurement, project staff, with the assistance of the CATIE's Integrated Pest Management Project staff and ROCAP environmental and pest management specialists, will carry out these environmental evaluations. All mitigative measures determined to be necessary will be incorporated into the technology packages before their transfer to the CA/P region. This procedure is established based on 216.3(a) (7).

C. Deferment of environmental evaluation for the specific technology packages to be promoted under the project is requested based upon the environmental procedures 216.3 section (a) (i). Approval for this procedure is requested for the following reasons:

1. This IEE cannot analyze the specific research findings that will be transferred to the countries since the research is not yet concluded, and the specific technological packages are not yet determined.
2. An environmental analysis will be performed for each technical package before extended to the field and applied in the countries. Given the regional nature of this project, this procedure will yield much greater efficiency since one threshold decision will probably allow the transfer of coffee pest control technology to all other CA/P countries without further environmental evaluation.
3. In addition, the Regional Coffee Pest Control Project, under the direction of IICA/PROMECAFE, will be the most suitable and best prepared institution to carry out this environmental analysis because of the extensive research and field trials that would have been carried out.

In summary, ROCAP requests a negative determination for the overall project including its research and network establishment/promotion activities. Furthermore, a deferred threshold decision is requested for the technology transfer component, specifically for all the technology packages proposed to be extended for coffee production and pest control by the project, and specifically for chemical control of coffee bean borer and rust. These technological packages will be analyzed and approved on a case-by-case or on a collective basis. Approval from the LAC/CEO will be required for the expenditure of funds for transfer and promotion of specific coffee production and pest control packages, which includes the use and procurement of pesticides.