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UNCLASSIFIED

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

ROCAP

PROJECT PAPER

REGIONAL COFFEE PEST CONTROL

LAC/DR:81-3

Project Number:596-0090

UNCLASSIFIED

AGENCY FOR INTERNATIONAL DEVELOPMENT  <b>PROJECT PAPER FACESHEET</b>	1. TRANSACTION CODE <div style="border: 1px solid black; display: inline-block; padding: 2px;">A</div> A ADD C CHANGE D DELETE	PP  2. DOCUMENT CODE <div style="border: 1px solid black; display: inline-block; padding: 2px;">3</div>
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3. COUNTRY/ENTITY ROCAP - CENTRAL AMERICAN REGIONAL	4. DOCUMENT REVISION NUMBER <div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px;"></div>
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5. PROJECT NUMBER (7 digits) <div style="border: 1px solid black; display: inline-block; padding: 2px;">596-0090</div>	6. BUREAU/OFFICE A. SYMBOL LAC	B. CCDE <div style="border: 1px solid black; display: inline-block; padding: 2px;">05</div>	7. PROJECT TITLE (Maximum 40 characters) <div style="border: 1px solid black; display: inline-block; padding: 2px;">REGIONAL COFFEE PEST CONTROL</div>
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8. ESTIMATED FY OF PROJECT COMPLETION FY <div style="border: 1px solid black; display: inline-block; padding: 2px;">86</div>	9. ESTIMATED DATE OF OBLIGATION A INITIAL FY <div style="border: 1px solid black; display: inline-block; padding: 2px;">81</div> B. QUARTER <div style="border: 1px solid black; display: inline-block; padding: 2px;">3</div> C. FINAL FY <div style="border: 1px solid black; display: inline-block; padding: 2px;">85</div> (Enter 1, 2, 3, or 4)
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10. ESTIMATED 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	196	154	350	1196	2304	3500
(GRANT)	( 196 )	( 154 )	( 350 )	( 1196 )	( 2304 )	( 3500 )
(LOAN)	( - )	( - )	( - )	( - )	( - )	( - )
OTHER U.S.	1.					
	2.					
HOST COUNTRIES	-	12	12		2073	2073
OTHER DONOR(S) Regional*	-	34	34		1576	1576
<b>TOTALS</b>	<b>196</b>	<b>200</b>	<b>396</b>	<b>1196</b>	<b>5953</b>	<b>7149</b>

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY <u>81</u>		H. 2ND FY <u>82</u>		K. 3RD FY <u>83</u>	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
(1) FN	121	079	-	350	-	939	-	820	-
(2)									
(3)									
(4)									
<b>TOTALS</b>				<b>350</b>		<b>939</b>		<b>820</b>	

A. APPROPRIATION	N. 4TH FY <u>84</u>		Q. 5TH FY <u>85</u>		LIFE OF PROJECT		12. IN-DEPTH EVALUATION SCHEDULED  MM   YY <div style="border: 1px solid black; display: inline-block; padding: 2px;">08   83</div>
	O. GRANT	P. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	
(1)	881	-	510	-	3500	-	
(2)							
(3)							
(4)							
<b>TOTALS</b>	<b>881</b>	<b>-</b>	<b>510</b>	<b>-</b>	<b>3500</b>	<b>-</b>	

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

1	1 = NO 2 = YES
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14. ORIGINATING OFFICE CLEARANCE SIGNATURE TITLE Acting Director, ROCAP	15. DATE DOCUMENT RECEIVED IN AID/W. OR FOR AID/W DOCUMENTS. DATE OF DISTRIBUTION  DATE SIGNED <table style="width:100%; text-align: center;"> <tr> <td>MM</td><td>DD</td><td>YY</td> <td>MM</td><td>DD</td><td>YY</td> </tr> <tr> <td>  4</td><td>  15</td><td>  81</td> <td> </td><td> </td><td> </td> </tr> </table>	MM	DD	YY	MM	DD	YY	4	15	81			
MM	DD	YY	MM	DD	YY								
4	15	81											

\* Regional Estimated Costs include - IICA/PROMECAFE CATIE and OIRSA.

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
WASHINGTON D C 20523

**PROJECT AUTHORIZATION**

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, 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 Three Million Five Hundred Thousand United States Dollars (\$3,500,000) in grant funds ("Grant") over a five-year period 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.

2. The project ("Project") consists of supporting a regional effort within Central America and Panama to (a) develop information on the epidemiology of rust and the effectiveness of selected fungicides, (b) develop residue and tolerance data for the uniform registration of pesticides, (d) develop and reproduce high-yielding rust resistant varieties of coffee, (e) develop and adapt appropriate technologies for the small coffee farmer and (f) develop a comprehensive coffee information network.

3. The Project Agreement, which may be negotiated and executed by the officer to whom such authority is delegated in accordance with AID regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as AID may deem appropriate.

a. **Source and Origin of Goods and Services**

Goods and services, except for ocean shipping, and except as provided in subsection 3.e. hereunder, financed by A.I.D. under the Grant shall have their source and origin in the United States or in countries that are members of the Central American Common Market, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Grant shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

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 Agronomico Tropico de Investigacion y Ensenanza (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. Condition Precedent to Disbursement for Project Activities in Participating Countries

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement to finance Project activities in a 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.

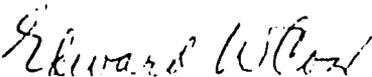
d. Covenants

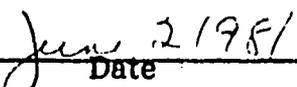
The Grantee shall covenant that, unless A.I.D. otherwise agrees in writing, it will:

- (1) Provide such goods and services for the Project during the period May, 1981 through May, 1986 as may be agreed upon between the Grantee and A.I.D., in an amount not less than \$1,576,000 equivalent.
- (2) 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.

e. Waivers

- (1) Goods and services for training and testing for rust resistance, financed by A.I.D. under the Project Agreement in an amount not to exceed \$350,000 may have their source and origin in countries included in A.I.D. Geographic Code 941, except as A.I.D. may otherwise agree in writing.
- (2) Goods and services for training and testing for rust resistance, financed by A.I.D. under the Project Agreement in an amount not to exceed \$350,000 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.

  
\_\_\_\_\_  
Acting Assistant Administrator  
Bureau for Latin America  
and the Caribbean

  
\_\_\_\_\_  
Date

Clearances:

GC/LAC:BVeret: br date 5/29/81  
LAC/CEN:PFarley: 2B date 5/29  
LAC/DR:CPeasley: GP date 5/29/81

LAC/DR:MBrown: 93 date 6/2/81

GC/LAC:DAAdams:ckg:5/21/81:x29183

REGIONAL COFFEE PEST CONTROL  
596-090  
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- A. Logical Framework
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## I. SUMMARY AND RECOMMENDATIONS

### A. Recommendations

1. Approval of the project described herein for a total cost to AID of \$3,500,000 in grant funds (Food and Nutrition).
2. Approval of a 60-month project period with a project activity completion date of May 31, 1986.
3. Notification to Congress of the above actions.
4. Authorization of FY 1981 funding of \$350,000 to provide the AID contribution to first year activities.
5. Waiver of source/origin requirements to allow procurement of special services from Code 899 (Portugal) and from Code 941 countries.

### B. Summary Description

This project will support an on-going regional effort to develop a comprehensive program to technify coffee production, including the control of coffee rust and broca.

The project will assist in the expansion and acceleration of research and related activities in the following areas:

1. biology and epidemiology of coffee rust;
2. methods for the control of broca;
3. efficacy assessments of chemical controls for both coffee rust and broca;
4. residue analysis and registration and use regulations of pesticides;
5. development and reproduction of rust resistant varieties;
6. development, adaptation and transfer of appropriate technologies for small coffee farmers;  
and

7. development of a coffee information network and data bank.

The project will be coordinated by the PROMECAFE program of IICA and will include the direct participation of CATIE, OIRSA and the relevant national research agencies. In addition, the specialized supportive services of the University of Vicosa in Brazil, and CICF in Portugal, will be used for testing promising varieties for rust resistance, and the services of APHIS of USDA will be used for the safe procurement of new germplasm from other countries.

The project will give major emphasis to training in order to enhance the capability of national level staff to carry on the development and dissemination of improved coffee technification practices after termination of the project.

C. Summary Findings

The technification of coffee, including the control of coffee rust and broca, is critical to the economic and social welfare of the CAP region. The control of coffee rust and other major pests is technically and economically feasible when included as an integral part of coffee technification. The major current constraints are the lack of adequate numbers of qualified research personnel, the lack of high yielding rust resistant varieties, inadequate credit resources and lack of knowledge about modern coffee production among small farmers. The proposed project is designed to upgrade the research capability of national level personnel as well as develop and multiply rust resistant high yielding varieties. The project will also contribute to strengthening the knowledge base of national level outreach personnel and in turn small farmers. The provision of credit will not be a function of the project but the enhanced capability of personnel at the national level should contribute to improved preparation of loan requests. Our conclusion is that the proposed project is feasible and will contribute to the control of coffee pests and improved coffee production.

Statutory Criteria

The project meets all statutory criteria. See Annex F.

Mission Director's 611 (e) Certification

The required certification is provided in Annex D.

D. Composition of the Project Development Committee:

Co-Chairmen: William McCluskey, Regional Agricultural  
Development Officer, ROCAP  
Peter Lopera, IDI, ROCAP

Members: Clark Joel, Economic Officer, ROCAP  
John Kelly, USAID, Honduras  
Mark Smith, DSB, AID/W  
Robert McColaugh, Deputy Regional Agri-  
cultural Development Officer, ROCAP  
Eduardo Trujillo, Pest Management  
Specialist, ROCAP  
Ramiro Eduardo, Office of Controller, ROCAP

Other Contri-  
butions: Kevin Kelly, CDO, USAID/Bolivia  
Charles Oberbeck, USDA/PASA, USAID/Honduras  
Darell McIntyre, IDI, USAID/El Salvador  
Carlos Enrique Fernández, Director, PROMECAFE  
Carlos Meyer Arévalo, Director, OIRSA  
Guillermo Otero, OIRSA

Reviewing  
Officer: John R. Eyre, Acting Asst. Director, ROCAP

Approving  
Officer: Henry H. Bassford, Acting Director, ROCAP

## E. Acronyms and Equivalentents

- ACAFE -- Asociación Nacional del Café - Panamá
- AGRINTER -- Inter American Agricultural Information System
- AGRIS -- FAO Agricultural Information System
- ANACAFE -- Asociación Nacional del Café - Guatemala
- APHIS -- Animal and Plant Health Inspection Service
- BANDESA -- Banco de Desarrollo Agrícola
- CABEI -- Central American Bank for Economic Integration - Honduras
- CAP -- Central America and Panama Region
- CATIE -- Centro Agronómico Tropical de Investigación y Enseñanza,  
Turrialba, Costa Rica
- CCPR (Codex) -- Codex Committee on Pesticide Residues (UN)
- CICF -- Centro de Investigacao das Ferrugens do Cafeeiro, Oeiras,  
Portugal
- CIRSA -- Comité Internacional Regional de Sanidad Agropecuaria
- CRIES -- Comprehensive Resources Inventory Evaluation System
- DIPSA -- Dirección de Planificación Sectorial Agrícola - Nicaragua
- FAO -- Food and Agriculture Organization - Rome
- IBRD/BIRD -- International Bank for Reconstruction and Development -  
Washington
- ICAITI -- Instituto Centroamericano de Investigación y Tecnología  
Industrial - Guatemala
- IDB/BID -- Interamerican Development Bank - Washington
- IFCC -- Instituto Francés de Café y Cacao - Paris
- IHCAFE -- Instituto Hondureño del Café - Honduras

IICA -- Instituto Interamericano de Cooperación Agrícola - Costa Rica  
INCAP -- Instituto de Nutrición para Centroamérica y Panamá - Guatemala  
INMECAFE -- Instituto Mexicano del Café - México  
ISIC -- Instituto Salvadoreño de Investigaciones del Café - El Salvador  
OFICAFE -- Oficina del Café - Costa Rica  
OIRSA -- Organismo Internacional Regional de Sanidad Agropecuaria -  
El Salvador  
OPSA -- Oficina de Planificación Sectorial Agropecuaria - Costa Rica  
PROMECAFE -- Programa Cooperativo para la Protección y Modernización  
de la Caficultura en México, Centroamérica y Panamá  
SAS -- Statistical Analysis System  
SINIA -- Sistema de Información sobre Investigaciones Agropecuarias  
UNCAFENIC -- Unión Nacional de Caficultores de Nicaragua - Nicaragua  
USDA -- U.S. Department of Agriculture - Washington  
USEPA -- U.S. Environmental Protection Agency - Washington  
VICOSA -- University of Vicosa - Minas Gerais, Brazil  
WHO -- World Health Organization

#### Equivalents

Manzana = .7 of a hectare (1.729 acres)

Quintal = 100 pounds (45.36 kg.)

## II. Project Background

### A. Definition of the Problem

Coffee rust is one of the most serious known threats to coffee plants. It is caused by a fungus which attacks the leaves and gradually destroys them. Eventually, the leaves begin to fall causing a corresponding reduction in the photosynthetic capacity of the plant. If this process of defoliation remains unchecked, the health of the plant will deteriorate along with yields, and, eventually, the plant dies. Coffee rust was the earliest of the major tropical plant diseases to be reported and studied and has caused enormous financial losses since it was first reported in Sri Lanka in 1869. In the brief space of approximately 10 years, coffee rust virtually eliminated the coffee industry on that island. It subsequently spread to all other coffee growing countries in Asia, causing extremely severe losses, especially in Indonesia where coffee production was reduced to almost nothing within a few years of the introduction of the disease.

Coffee rust first appeared in the American continent in 1970. It started in Brazil, but spread rapidly to Paraguay, Bolivia and Peru. In Central America, it made its first appearance in Nicaragua in 1976 and spread to El Salvador in December of 1979. The disease is now well entrenched in Honduras and has been confirmed in four distinct areas of Guatemala including the department of Retalhuleu, less than fifty miles from the border with Mexico. Since the completion of the ROCAP/PROMECAFE study in November, 1980, the presence of the rust in Honduras and Guatemala is no longer a matter of speculation; it is a confirmed fact.

The rust spreads via wind-borne spores or is transported by man. Thus far, border controls have been ineffective in stopping the advance of the disease in Central America. Four basic components are all that are necessary for a plant disease epidemic: a susceptible host, a virulent pathogen of the disease, an environment conducive to the development of the disease, and a sufficient period of time for the epidemic to develop.

All of the known coffee cultivars in production in Central America are susceptible to attack by rust and the climatic conditions for the development of the disease are

near perfect in many of the coffee growing areas. The ideal climatic conditions occur over a sufficient number of months each year to permit the rapid development and spread of the disease.

B. Current Magnitude and Implications of Spread

In Nicaragua, coffee rust has affected 12,400 manzanas (some 22,000 acres - 1 manzana = 1.75 acre) in the Carazo/Masaya area, although 19,000 manzanas have been placed under quarantine. Fortunately, the affected area is not in a major coffee growing zone and the disease has not yet spread. Complete eradication was attempted in 1977 and 1978 by burning and stumping the trees. Approximately \$20 million was spent in the eradication effort, but it is generally considered a failure (see Section II C.1 below for further discussion.)

In El Salvador, coffee rust first appeared in the eastern part of the country, but has recently been found in the western and central parts as well. The ROCAP/PROMECAFE study of November, 1980 estimated that 1,500 manzanas were actually infected, while the total area affected, (or immediately threatened), was estimated at 13,000 manzanas. According to ISIC, by mid-February 1981 coffee rust had been detected in 10,000 distinct locations in El Salvador and is threatening 30,000 hectares or 75,000 acres in that country. Officials at the Ministry of Agriculture, Guatemala, estimate that 1,000 manzanas are infected with the coffee rust, while 45,000 manzanas are threatened. Figures for Honduras are similar to those of Guatemala, but pose a relatively larger threat, because Honduras devotes less land area to coffee production.

Based on the experiences of other countries, particularly Brazil, Paraguay and Bolivia, it has been conservatively estimated that if no serious effort is made to control the spread of coffee rust, losses to total exports of coffee from Central America will rise from 5% in 1982 to 20% in 1984 and 50% by 1987. It is not estimated that losses will exceed that level in subsequent years. The effect of such losses on the regional economy would be disastrous.

In 1979, the region's total coffee exports were estimated at \$1.83 billion -equal to 40% of the region's total merchandise exports. An eventual loss of 50% of the region's coffee crop would amount to over \$900 million, which is 3-1/2 times the total level of the region's aggregate balance of payments deficit in 1979.

There would also be substantial losses in tax revenues, owing to the importance of export taxes in the tax structures of the Central American countries. In the case of El Salvador, for example, coffee export taxes account for about a third of the total tax collections. A recent Central American study on the possible magnitude of the economic impact of coffee rust estimated that losses to tax revenue collections from the disease could amount to \$33 million in 1980 and \$65 million in 1981.\*

Contrary to popular belief, coffee is not a big farmer crop. Table I shows that the number of small coffee producers in each country represents the majority of producers. For the region as a whole, approximately 86 percent of all producers or almost 206,000 persons, are classified as small farmers.

Based on available data, it is estimated that coffee directly generates almost 500,000 jobs in Central America (see Table 1). This number constitutes approximately 1/3 of the total number of jobs in the agricultural sector. If the coffee industry should suffer the unchecked impact of coffee rust, there is no industry presently in sight that could absorb the number of workers that would be released.

### C. Alternative Responses to the Problem

There are several alternative responses to the rust problem, including eradication, chemical control, planting of resistant varieties and technification. These responses

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\* Posible Impacto de la roya del cafeto sobre la actividad cafetalera y las economías de Centroamérica, México y Panamá, Feb. 1979. Study coordinated by Ing. Guillermo Otero Medal, Tables A and 15.

TABLE 1NUMBER OF FARMS, SMALL PRODUCERS AND JOBS  
IN COFFEE IN THE C.A. REGION

	<u>No. of Farms</u>	<u>No. of Small Producers</u>	<u>No. of Man/Days</u>	<u>No. of Jobs Per Year</u> <sup>1/</sup>
Guatemala	43,352	34,000	29,217,000	167,000
El Salvador	43,779	34,569	28,800,000	110,769
Honduras	38,800	37,881	13,040,000	73,300
Nicaragua	17,483	14,924	17,700,000	61,400
Costa Rica	65,000	55,250	16,690,000	64,154
Panama	30,742	29,000		18,500 <sup>2/</sup>
	<hr/>	<hr/>		<hr/>
	239,156	205,624		495,123

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<sup>1/</sup> To convert man/days into jobs, it was assumed that the year consists of an average of 260 work days.

<sup>2/</sup> Estimated on the basis of ratio of area under cultivation to number of jobs in Costa Rica.

Source: Studies and reports published by each country (Central Bank of Guatemala, IHCAFE in Honduras, DIPSA in Nicaragua, OPSA in Costa Rica, and ISIC in El Salvador). The figure for Panama is imputed.

are introduced briefly here. More detailed evaluations of the possible alternative approaches are presented in the Technical Analysis.

1. Eradication: Complete eradication of rust-infected plants was tried in Nicaragua in 1977 and 1978, but was not successful. The attempt appeared reasonable at the time, since rust had infected only a fairly isolated area which was not located in the main coffee producing region of the country. Since rust had not appeared elsewhere in Central America, the other countries saw it in their interest to help eliminate the disease before it could spread. Of the \$20 million spent on the eradication effort, \$12 million was provided by other Central American countries and channelled to Nicaragua through CABEI. Although all the coffee plants in the affected area were destroyed, because of the Civil War in Nicaragua, necessary follow-up measures, such as field and laboratory tests were not performed. The rust survived and, as indicated, has now spread to El Salvador, Honduras and Guatemala. Eradicating the disease is not now considered feasible because the infected area is now too large and the cost of eradication would be exorbitant, both in terms of the materials required, and the income that would be lost because of decreased production.

2. Chemical Control or Prevention: Control of the disease through spraying, usually of copper-based fungicides, is the only approach which is immediately available once rust is identified in an area. However, the cost of chemical control requires that production levels be high enough to make spraying economically feasible. At the present time, the cost of spraying is equal to the value of about 2 quintales of coffee production per manzana. In the absence of complementary and improved production techniques, (i.e., technification) this cost is prohibitive for small farmers whose average yield is 5 to 10 quintales per manzana. In Honduras, it is estimated that the cost of such spraying would add 40% to the cost of production on low-yielding traditional farms, but only about 10% under technified conditions. Thus, without the adoption of a comprehensive program to boost yields, including, in the long run, the planting of high yielding rust-resistant varieties, most small farms are in serious danger of being driven out of business.

3. Resistant Varieties: This approach calls for new, rust-resistant varieties to be planted in place of existing varieties which are subject to rust damage. At the present time, high yielding resistant varieties either have not been proven or are not available in Central America. Several potentially resistant varieties have been selected for testing, but commercial quantities of seeds or plant materials are not yet available. While re-planting with rust-resistant varieties may provide the best alternative for the small farmer, it is a long-run process which can only be implemented gradually in conjunction with other improved techniques.

4. Technification: Technification of coffee refers to the sum of operations involving the application of modern scientific techniques to coffee farming, including reduction of shade and accompanying increases in fertilization, scientific pruning and restructuring of coffee plantations, increasing the density of planting from less than one thousand to between three and five thousand plants per manzana, spraying against coffee rust and coffee borer, if necessary, systematic surveying to detect diseases, and the planting of new high-yielding and rust-resistant varieties as they become available. It is estimated that technification could raise average yields from the current 5 to 10 quintales per manzana achieved using traditional methods to an average range of 25 to 30 quintales per manzana, with yields of up to 40 quintales possible under near optimal conditions. Calculations show that the cost of controlling coffee rust can easily be borne on technified coffee farms.

#### D. Interest, Commitment, Measures Taken

##### 1. At the National Level

A survey, conducted by a team of specialists contracted by ROCAP to examine the problem found that concern for coffee rust at senior government levels varied in direct proportion to how close rust is to infecting production in their country. Thus, concern is highest in El Salvador, Nicaragua, Honduras and Guatemala, and lowest in Panama and Costa Rica. On the other hand, the ministries of agriculture and coffee institutes in all Central American countries are keenly interested in coffee technification, which

they feel merits the highest priority if the region's potential in the area of coffee cultivation and export is to be realized.

Paralleling an increasing awareness of the need to combat coffee rust, particularly through technification, is the recognition that the present commitment of financial resources for this purpose is inadequate. (See Annex G, Table I for current funding levels.) A number of Central American countries are attempting to obtain funds from the international financing agencies in order to carry out technification programs. Applications totalling \$62 million (see Annex G, Table II) are currently pending, with the largest requests submitted to the IDB, followed by CABEI and AID. The principal applicants are Nicaragua and Honduras, the two countries that have also committed the largest amount of their own resources to coffee rust and technification programs.

The following presents a brief description of the level of commitment of each country in dealing with the rust problem:

a. Guatemala

The commitment of Guatemala to deal with coffee rust has increased in the past several months as large areas have become infested. In November, 1980, when the rust in El Salvador was approaching the border with Guatemala, field inspections and quarantine measures were increased along the border. During the same period, the GOG and Mexico entered into an agreement to control rust. This agreement provided for \$500,000 to be contributed by each of the two countries, and for the operating body of the agreement, the Comisión de la Roya, to monitor and contain the spread of the disease.

Financing to permit the small farmer to technify and control the rust would come from two sources: The Banco de Desarrollo Agrícola (BANDESA) and the Central Bank. There is a trust fund agreement by which BANDESA receives the proceeds from a tax on coffee exports, while the Central Bank maintains a \$84 million line of credit for the agricultural sector, \$20 million of which is specifically for coffee production. ANACAFE and agencies working with coffee rust have proposed the establishment of a \$75 million line of

credit specifically for technification and rust control to the Monetary Junta (a board consisting of the Ministers of Finance, Economics, Agriculture and other ministerial level officials), but the request was recently rejected. ANACAFE has also requested that the USAID Mission sponsor an evaluative study of the coffee rust, to be followed up by a possible technical assistance and credit projects.

The most recent step taken by Guatemala has been the formation of an evaluative commission made up of representatives of ANACAFE, OIRSA, the Director of Agricultural Services of the Ministry of Agriculture, and representatives of several other concerned agencies.

As a further indication of the concern for protecting coffee production in Guatemala, the Central Bank has completed a study which proposed the technification of 200,000 manzanas over a period of 10 years at the rate of 20,000 manzanas per year. The total bank credit requirement for this program is estimated to be \$226 million.

b. Honduras

The Government of Honduras has developed a well-conceived plan of action against rust and the coffee borer. Preventive measures, including border inspections, quarantines, fumigations, training of technicians and radio-broadcast instructions have been initiated, and a cordon sanitaire has been established in the border zone. IHCAFE, the National Coffee Institute, is implementing two programs designed to combat rust and the coffee borer with a budget of slightly more than \$1 million in GOH resources. An increase to \$3.5 million for the programs has been requested. IHCAFE is also receiving an additional \$10 to \$12.5 million per year for its general program to improve coffee production, including technification. In addition to these resources, the GOH has requested financial assistance from the IDB and AID for \$10 million each for outreach and credit programs, and technical assistance and from the UN for studies and research on technification.

Finally, the GOH has developed a plan for the technification of 40,000 manzanas over a four year period at an estimated cost of \$90 million. Although funding for the plan has not yet been approved, the plan in itself constitutes a demonstration of the government's commitment to combat the coffee rust problem.

c. El Salvador

Coffee rust was identified in El Salvador in December, 1979. The government rejected eradication as a means to deal with the problem and, instead, has established quarantines in the affected areas. Initial spraying of fungicides were financed by the GOES and, subsequently, a law was passed requiring the farmers to undertake all additional spraying necessary. ISIC has also undertaken an ambitious research program on the rust problem and particularly on the conditions under which it spreads and how to control it.

Resources available to ISIC and the Departamento de Defensa Agropecuaria for surveys, information campaigns, and control and quarantine operations total only \$1.24 million. ISIC is seeking an additional \$1.2 million in 1981 for its program on coffee rust. They are also developing loan applications with CABEI (\$10 million) and the IDB (\$4 million). The Central Bank has a \$6.4 million credit line through the commercial banks for supervised loans to farmers and requires that the borrower accept ISIC's instructions and supervision.

El Salvador also is developing a plan to technify the areas which have been affected by coffee rust but has not finalized the plan or established the financial requirements for its implementation. Nonetheless, the GOES has shown its full awareness of the seriousness of the coffee rust problem and is taking action to control it.

d. Nicaragua

In spite of the fact that it was the first country to experience the impact of coffee rust, Nicaragua currently is not following a formal action plan to deal with the problem. However, the government has established a program for replanting and technifying the 12,400 manzanas where plants were destroyed in the 1978 eradication effort. Some replanting has already occurred, and by 1982 all the land is expected to be replanted. The government also estimates that an additional 30,000 manzanas have already been technified, and that by 1982, over 42,000 manzanas, or 34 percent of the land in coffee, will be technified. Although no specific plan exists, government officials believe approximately 10,000 manzanas can be technified each year.

The 1980 budget for coffee rust control and land renovation is \$22 million. An additional \$20 million is planned for the next two years, although not from internal sources. The GON is preparing a \$20 million loan application with the IDB and has a \$4.8 million application pending with CABEI.

Nicaragua is facing an additional problem in that a large number of qualified technicians have left the country. The government must give priority attention to training new personnel in order to carry out its activities.

Another area of difficulty is that the government must receive more private sector cooperation. However, uncertainty regarding land ownership, the GRN commitment to the concept of private property, as well as high taxes and insufficient credit, inputs and equipment have limited such cooperation.

In sum, Nicaragua has shown a strong determination to confront the coffee problem, but is facing several political and economic obstacles which limit its ability to act.

e. Costa Rica

When coffee rust was first identified in Nicaragua, the GOCR established a commission to determine the most appropriate measures to prevent the entry of the disease into Costa Rica. The Ministry of Agriculture began to train staff to undertake inspections and to provide instructions to farmers. However, since rust has not yet been detected in the country, the initial concern has lessened considerably, and the 1980 budget for the coffee rust prevention programs is only \$140,000. In addition, the government has a \$1.5 million loan application pending with CABEI which would reinforce national funds for this program.

Considerable interest in coffee technification exists in Costa Rica, and the process is much more advanced than in other Central American countries. Yields averaging 20 quintales per manzana are presently common on small farms. This is from two to four times the average small farm yield in other countries. To continue with the technification efforts, the government has prepared a proposal for technifying 36,000 manzanas over a 6-year period. This would

increase the technified areas to 79 percent of all the land planted in coffee. The proposal calls for the banking system to finance the \$82 million cost of the program; however, the present budgetary situation and balance of payments problems may reduce the likelihood of obtaining the necessary funds.

The level of GOCR commitment to control coffee rust, in terms of financial resources, is low, but there is significant interest in carrying out the rest of the technification program.

f. Panama

Coffee is not as important a crop in Panama as it is in other Central American countries. Until 1973, the government provided no support to coffee, and currently does not have a plan to deal with rust. The government has, however, set a goal of technifying almost 2,000 manzanas (approximately 6 percent of the total land currently planted in coffee) over the next three years. The cost is estimated to be \$4.4 million, of which approximately one half would be financed through a loan with the IBRD and the rest from internal sources.

2. Commitment at the Regional Level

At the regional level, a number of institutions have done their best to increase the awareness of the national governments as to the seriousness of the threat represented by coffee rust and other coffee plant diseases. IICA has been working on coffee pests and diseases since the early 1960s and has aided in the preparation of a number of regional projects designed to limit the spread of rust. IICA and CATIE have sponsored various high-level meetings to stimulate awareness and provide guidance to national organizations in the area of coffee research. CATIE has maintained an extensive collection of coffee varieties and are constantly adding new introductions. Seeds which have demonstrated a high degree of rust resistance have been distributed in small quantities to all of the countries of the region for further field testing.

Another regional organization, OIRSA, has played a major role in advising the governments on plant quarantines, inspections and control measures. OIRSA has also assisted the governments on revising legislation relating to plant diseases and sanitation.

A major new regional effort was launched in 1978 with the creation of PROMECAFE (at the initiative of IICA and the National Coffee Associations) to promote, through regional cooperation, agronomic research and the development of improved technologies for coffee production. Thus far, PROMECAFE has been instrumental in increasing national level awareness of the potential threat of coffee rust, and the national governments and coffee institutions have responded by committing \$40,000 equivalent each in annual quotas to support PROMECAFE. This awareness has spread well beyond national and even regional boundaries. It is now a matter of hemispheric concern as well. Mexico and Venezuela are developing plans for a \$100 million fund to assist Central America in technification and the control of the disease.

#### E. Gaps and Constraints

The major constraints to an effective action program in the area of rust control and coffee technification include:

##### 1. Budgetary and Balance of Payments Problems:

The recent decline in the world market price of coffee has resulted in a sharp decline in government revenues. At the same time, some governments in the area (e.g., El Salvador, Nicaragua and Guatemala) are faced with the need of increasing security expenditures, as well as spending more on social investment to satisfy the legitimate demands of lower-income groups. The decline in the price of coffee has not only reduced the resources of the governments at a critical time, it has also reduced the capital that coffee growers can allocate to the technification of their farms to defray the high cost of coffee rust spraying.

The region's balance of payments difficulties (Nicaragua, El Salvador and Costa Rica face large balance of payments deficits) make it harder for the region to devote the necessary foreign exchange resources to import fertilizer, pesticides and other inputs required by a coffee technification program. At the same time, all of the Central American countries have found it increasingly difficult to obtain additional financing from foreign commercial banks. Thus, the availability of public and private sector resources

is decreasing at a time when increased investment is required in order to mount and maintain effective programs to combat and control coffee rust.

2. Shortage of Technical Personnel: All Central American countries face a shortage of trained agronomists to conduct research and direct extension programs. The shortage of personnel and of resources for recruitment and training is prevalent at both the national and regional levels.

3. Lack of Tested Varieties: CATIE and the national coffee institutes are experimenting with new varieties. High yielding and rust resistant varieties have been developed in Brazil and have been brought to the region for testing and experimentation. This work is underway but is far from completed. Testing is required to determine the rust resistant and yield characteristics of the varieties under the environmental conditions found in Central America, and, in addition to the initial field testing done on these varieties, several generations of the varieties must be multiplied and tested to assure that the desired characteristics are not lost. At the present rate of progress, it will be several years before new varieties can be made available in sufficient quantities to meet the region's requirements. However, it is expected that the proposed project will significantly accelerate the ongoing research program at the regional level.

The proposed project is a vital element in a much larger and more comprehensive program to technify coffee cultivation and control the extension of coffee rust. If new rust resistant varieties cannot be made available very soon the only effective method of control is the spraying of coffee plants that have been or are about to be affected. As previously indicated, spraying is not economic on non-technified farms and most small farms in the region are not technified. Thus, unless small farms can be quickly technified, many, perhaps most, will be unable to survive. By planting new rust resistant varieties, the small farmer will be able to reduce significantly his costs of production by eliminating and/or reducing the need for expensive chemical control.

F. Major Assumptions

The proposed project makes the following major assumptions:

1. Coffee rust, if left uncontrolled, will have a devastating effect on the region's coffee production.
2. Technification of coffee cultivation is the most promising and feasible strategy available to address the problem. The development of suitable high-yielding and rust-resistant varieties is an essential aspect of the technification program.
3. The development and testing of rust-resistant varieties can be done most effectively by regional institutions working in close cooperation with national research institutions. There are economies of scale in encouraging regional efforts, since the regional institutions are in the best position of providing guidance and of coordinating the efforts of the national institutions. They are also best able to provide training to technical personnel.
4. The national governments are prepared to carry out major programs to technify coffee farms in their countries and are willing to significantly expand the financial resources devoted to that purpose. They will also make a special effort to reach small farmers as these are most in need of technical assistance and credit.
5. The international financial institutions - IDB, CABEI and the IBRD - are interested in helping the C.A. governments to finance their coffee technification programs, provided that well-justified, bankable projects are developed.
6. A substantial proportion of the region's small farmers will be willing to technify their farms if they are offered the necessary credit and are given access to essential inputs and technical assistance.

### III. Project Description

#### A. Relationship of the Proposed Project to the CDSS Strategy and Regional Priorities

The ROCAP development assistance strategy is, in part, based on using the capacity of regional institutions serving Central America to provide assistance to target populations and to assist cooperating national institutions to improve services to target populations. The proposed project is completely consistent with this strategy. It will work through PROMECAFE, CATIE, OIRSA and other regional and national institutions to create an integrated control system in which the results from research on coffee rust and other pests can be adapted and applied to assist in increasing small farmer coffee production.

Because of the potential damage that rust and other coffee pests can cause in the region, Central American governments have placed high priority on developing appropriate and effective methodologies to deal with the problem. In recognition and support of this priority, ROCAP's most recent CDSS and the FY 1982 CP have placed high priority on the development of a regional coffee pest control program as a major initiative. In addition, discussions with bilateral Missions indicate a high priority for working on the problem at a national level (USAID/Honduras is currently developing a small farmer coffee production project to begin implementation in FY 1981). At the last Mission Director's Coordinating Committee conference in September, 1980, the need for a regional program which would complement national programs by supporting centralized research activities of regional institutions was discussed and endorsed.

As discussed in Section II.D.1 above, the Central American countries have made numerous requests to the multilateral and regional donors for assistance with their coffee rust programs, mostly to the IDB, but also to the World Bank and CABEI. In addition to multilateral assistance, France is providing one expert from the Instituto Francés de Café y Cacao (IFCC) who has been working with technicians from PROMECAFE on a variety of activities. Also the government of Honduras and USAID/H are preparing a \$10 million loan for implementation in FY 1981.

Outside the Central American region other institutions have undertaken research activities which are relevant to the coffee rust problem. The most important institutions in this regard are the University of Vicosa in Brazil and the Center for Coffee Rust Research (CIFC) in Portugal. The strategy of the project is to take advantage of the expertise and experience of these institutions by strengthening the relationship between them and the Central American institutions and actively involving them in project activities.

#### B. Project Goal and Purpose

The goal of the project is to increase the incomes of small coffee farmers in Central America.

The purpose of the project is to develop an integrated system employing 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. As discussed above, if left unchecked coffee rust will result in a major decrease in production. Since the majority of coffee producers in Central America are small farmers, research on methods for combatting rust and other pests must also focus on adapting the results such that appropriate technologies and improved management techniques can be introduced to, and be used economically and effectively by small farmers.

The project strategy calls for the basic research to be centralized at the regional level (with additional research and testing to be done at the national level) in order to coordinate activities and avoid duplication of efforts by regional and national institutions. Coordination of efforts at the regional level will make the use of available resources more efficient, will permit the acceleration of research activities, and will result in the delivery of new plant varieties and improved technologies in a shorter period of time.

In PROMECAFE the regional structure already exists for providing the required coordination of activities. PROMECAFE's advisory council is composed of representatives from all of the national coffee institutions and Ministries of Agriculture, as well as regional institutions involved in coffee research and plant protection and, therefore, will be in a strong position to coordinate project activities.

### C. Project Outputs

The primary focus of the project is research on coffee pest problems, particularly rust and how its effects can be controlled. As such the outputs of the project are summarized as follows;

1. Information on the epidemiology of the rust and the effectiveness of selected fungicides,
2. Development of an integrated pest management of broca, including evaluation of the effectiveness of biological and chemical controls.
3. Development of residue and tolerance data for uniform registration of pesticides taking into account requirements of coffee importing countries.
4. Development and reproduction of high-yielding resistant varieties of coffee, suitable to the Central American environment.
5. Development and adaption of appropriate technologies specifically for the small coffee farmer.
6. Training of technicians from regional and national institutions,
7. Development of a comprehensive coffee information network, including a computerized data base which will not be limited to coffee information developed in Central America, but will include information developed worldwide.

The first four project outputs relate to problem oriented research, while the latter three address the application of that research. The training, which will consist of on-the-job, short courses conducted by the regional institutions, and short-term at the University of Vicosa in Brazil and CIFIC in Portugal, will not only allow the countries to better carry out technification programs incorporating the project research results, but will also help the region to continue research activities after the completion of the project.

#### D. Beneficiaries

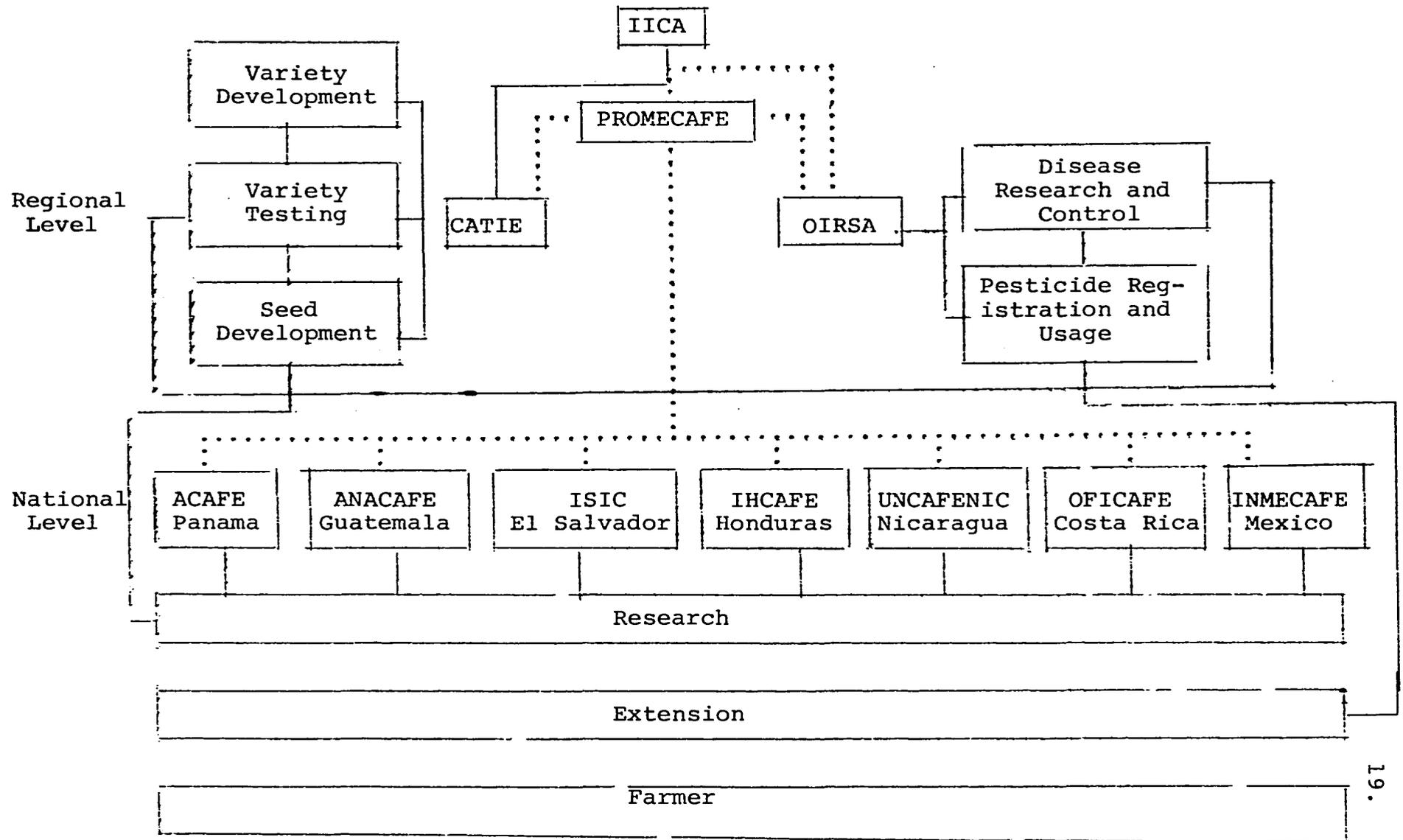
In this project AID in conjunction with IICA, OIRSA, and CATIE will provide resources to the national research agencies, who are ultimately responsible for controlling coffee rust, broca, and other coffee pests. The direct recipients of project outputs, in this regard, will be the national research agencies. The beneficiary target group will be the small coffee farmers and the coffee laborers on medium and large farms, who are composed of resident plantation laborers and migrant harvest workers. The Social Analysis discusses the composition of the small coffee farmer and the coffee laborer groupings in detail.

#### E. Project Activities

To achieve its objective of developing an integrated system to help combat the spread of coffee rust and other coffee pests, the project is designed to take advantage of the existing institutional structure for coffee production which has been developed in Central America. As mentioned earlier, PROMECAFE, a program under the auspices of the Instituto Interamericano de Cooperación para la Agricultura (IICA) was created to promote agronomic research and the development of improved technologies for coffee production. Two major regional research institutions --Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) and Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA)-- are signatories to the program and already have been working with PROMECAFE on various research activities. In addition, each country in the region has established an institution responsible for the promotion and improvement of coffee production which also are signatories to the program, as are the Ministries of Agriculture. The interrelationship of these institutions (see Figure 1) make PROMECAFE the logical choice for implementing the project.

Project activities will not change the focus of the current efforts of these institutions. Rather, the project will provide resources which will permit an acceleration and expansion of basic research and the development of an integrated system involving all of the institutions.

## Relationship of Participating Institutions



## 1. Biological Properties of Rust

This project component will seek to accomplish two objectives. It will develop a basic understanding of the epidemiology of coffee rust and determine the efficacy of available fungicides on sites representative of the principal agroecological coffee producing zones of the Region.

These two objectives are closely interrelated in that knowledge of the rust organism under local conditions is necessary in order to predict outbreaks and rate of spread of coffee rust, and to determine when best to apply control measures. Field assessment of the effectiveness of various fungicides is essential for the development of valid control recommendations. Samples of coffee berries and plant tissue from treated plots will also serve as the material input for the residue analysis in a related project component.

In order to achieve the above objectives, PROMECAFE, as the project coordinator, will be responsible for ensuring that the necessary laboratory/greenhouse and field studies are carried out. As presently contemplated, PROMECAFE will arrange with OIRSA to take the lead in carrying out these studies and will make available to them, a long term senior plant pathologist and several short term specialists who will be funded under the project. These staff additions, who will complement OIRSA's existing core and field staff assigned to the Project, will be contracted by IICA/PROMECAFE and selected with the concurrence of OIRSA.

PROMECAFE will also cooperate with OIRSA and other regional research entities in compiling the known information on the epidemiology of rust, using the information/data bank at IICA which has access to the FAO, USDA and other global repositories of coffee research information. Project funds will help finance the collection, storage and maintenance of this additional coffee research data within IICA's existing software systems.

OIRSA will be responsible for carrying out the necessary laboratory and greenhouse studies to verify the incubation period and life cycle of local races of rust under controlled conditions. El Salvador appears to be the most appropriate site for this effort as OIRSA will be able to

draw on experiences gained in the area by ISIC. However, due to the current political environment, it may be necessary to shift the center of operations to Honduras.

OIRSA, with the collaboration of PROMECAFE, will also arrange with the national research agencies in Honduras, Guatemala, El Salvador and possibly Nicaragua, to carry out two types of cooperative field studies in selected areas subject to rust. One type will be concerned with the biological properties and the other with efficacy of fungicides. The regional entities will provide guidance, assistance and supervision in research design, monitoring and reporting of data from and to the cooperating national agencies at the field level.

The field studies concerned with the biology of the rust will collect agroclimatic data such as minimum-maximum daily temperatures, frequency and intensity of rainfall, altitude, and the influence of cultural management factors (density of plants, quantity of shade, pruning, fertilizer, etc.) on the incidence, intensity and incubation cycle of the rust. The data, collected over a period of two to three years, will be correlated with the results obtained under controlled conditions in the laboratory/greenhouse studies, placed in the regional data/information bank, and made available to national research and outreach agencies. The results will provide the data for modifying the so-called Rayner equation for determining the incubation period of rust under local conditions which can be converted into a nomogrammic chart for use of national level field personnel.

The other series of field studies will assess the efficacy of available fungicides applied to selected, infected field sites representative of the coffee growing areas. Fungicides will be applied using various dosage rates, frequencies and types of application equipment. The sites will be monitored and the effectiveness of different treatments assessed. Supporting data on temperatures, rainfall, altitude and cultural management at each site will also be recorded. This information will make it possible to determine the most effective and economical treatment, as well as the interactions of treatment and cultural management practices. Coffee berries, and plant tissue from the treatments will be collected and used in the residue analysis component.

PROMECAFE and OIRSA working together will utilize the research results to develop training manuals and other training materials which will be used in short-courses to be given to national level technicians.

This training will strengthen national capabilities in field monitoring methods, prediction of new outbreaks, understanding the interactions of rust with cultural practices, and the selection of the most appropriate treatments.

In addition, it is anticipated that the analytical procedures and systems for rust control developed by the regional and national agencies will lead to the establishment of a working methodology that can be used to deal with other future pest problems.

In order to supplement OIRSA's in-house technical capacity in this area the project will finance the services of three technicians as well as their regional travel costs. In addition, project funds will be used to provide laboratory equipment, a greenhouse and field supplies and equipment. The cost of preparing training manuals and other materials as well as part of the costs of short courses will also be financed by the project.

At the regional level, IICA will provide a project administrator, who will handle the centralized administrative functions for all components of the project, and the services of the Director of PROMECAFE, who will devote eighty percent of his time to overall coordination of the project. In addition, IICA will make available the services of the regional computerized data/information bank and their reproduction and printing facilities.

OIRSA will contribute the services and support of a senior agronomist to participate in the field studies on epidemiology of rust and the chemical efficacy assessments as well as twenty-five percent of the Director's time for supervision of all components in which OIRSA participates.

The national research agencies will provide the field teams, their logistical support, field study sites, training facilities and support costs for the training of their personnel.

The input details are shown in the financial plan but a summary cost estimate of this component is as follows:

Biology of the Rust  
Summary Cost Estimates  
US 000's

	AID		Counterpart		Total
			Regional	National	
	P/M	Amt	Amt	Amt	Amt
<u>Personnel</u>					
Long Term Specialist	36	140	-	-	140
Short Term Specialist	12	96	-	-	96
Technical Personnel			189	272	461
Support Personnel	108	72	19		91
Laborers			2	142	144
Logistical and Administrative Support			16	42	58
Travel and Perdiem					
In-country travel		.61	30	56	147
Supplies & Equipment		138			138
Greenhouse		81			81
Facilities and Experimental sites				43	43
Training & Materials		31			31
Publications			5		5
Computer time			4		4
<b>Total Biology of the Rust</b>	<b>156</b>	<b>619</b>	<b>265</b>	<b>555</b>	<b>1,439</b>

## 2. Control of Broca

This component will seek to develop an effective, economical control program for the coffee bean borer (*Hypothenemus hampei*) which is commonly called broca.

This pest is the second most serious threat to regional coffee production and has to date been found in Mexico, Guatemala and Honduras. It was first identified in Guatemala, and since the early seventies has spread to Mexico and Honduras.

PROMECAFE will arrange with OIRSA to serve as the responsible institution for implementing this activity. OIRSA is currently engaged in cooperative research efforts with

Guatemala and Honduras and the project will provide resources to strengthen and expand this effort, especially focusing on developing a more integrated methodology of control at the field level.

In cooperation with the national research agencies, OIRSA will conduct efficacy assessments of pesticides applied on infected plots, which are representative of the agroecological coffee producing areas of the region. These studies will involve applications of different insecticides at varying dosage rates and times in order to determine the minimum levels of pesticides needed for effective control. Coffee berry samples will be collected from treated sites and submitted to ICAITI for examination of residue levels. In addition, field assessments will be made to evaluate the effectiveness of a promising biological control measure using the fungus "Beauveria bassiana" as well as cultural management practices such as the clean up of residue materials (unmarketable berries and dead branches of coffee plants).

In support of the field work, greenhouse and laboratory studies will be carried out. It is believed that the information gained from the field and the greenhouse/laboratory studies will make it possible to recommend an integrated control program for broca.

The research data and information developed by this component will be stored in the existing regional data/information system at IICA, details of which will be explained in another component. PROMECAFE and OIRSA will utilize this information to develop training manuals and other materials which will be used in short-courses offered to national level personnel, including, but not limited to, those in Guatemala and Honduras.

The proposed expanded research effort will require inputs from all entities involved. PROMECAFE will make available a long-term senior entomologist and a short-term biological control specialist to work with OIRSA personnel. It is expected that these specialists will provide guidance in monitoring and reporting of both field studies and laboratory/greenhouse studies. They will also provide technical assistance and on-the-job training to the technicians engaged in the broca investigations. These specialists and their logistical support will be financed by the project and will

be contracted by IICA/PROMECAFE. The project will also finance in-country travel costs, a greenhouse, limited laboratory equipment, field supplies, field equipment and the preparation of training materials and a part of the costs of short courses. OIRSA will contribute the services of their current research and field staff of two agronomists, three technicians and two support staff, including their logistical and administrative support and the use of existing laboratory facilities. PROMECAFE will provide the assistance of their staff for coordination, preparation of training materials and for training short courses.

The national research entities will provide field teams, their logistical support, field study sites, training facilities and training support costs for their personnel. A summary cost estimate of this component is as follows:

Control of Broca					
Summary Cost Estimates					
US 000's					
	AID		Counterpart		Total
	P/M	Amt	Regional	National	
		Amt	Amt	Amt	Amt
Long Term Specialist	36	140			140
Short Term Specialist	6	58			58
Technical Personnel			236	114	350
Support Personnel			19		19
Laborers			13	44	57
Logistical and Administrative Support			29	24	53
Travel and Perdiem					
In-country Travel		61	47	20	128
Supplies & Equipment		53			53
Greenhouse Construc- tion and Equipment		40			40
Facilities and Experimental sites				12	12
In-country Training and Materials		27			27
Computer Time			4		4
Publications			5		5
<b>Total Control of Broca</b>		<b>42 379</b>	<b>353</b>	<b>214</b>	<b>946</b>

### 3. Residue Analysis and Control/Registration of Pesticides

This component will seek to develop a system, acceptable to the regional and national entities, for the analysis of pesticide residues and establishment of standards for use and registration of pesticides in coffee production.

This activity is closely linked with the efficacy studies of pesticides used in the control of rust, broca, and/or other coffee pests, since berry and plant tissue samples from those studies will provide the materials for analyses of residues.

OIRSA, the lead institution for the rust biology and broca components, will also be the principal institution responsible for implementing this component.

OIRSA is the legally chartered regional organization responsible for defending the member countries common agricultural resources against pests and diseases, which by their character and magnitude can only be controlled through regional and international cooperation. The formulation of OIRSA's operational policy is directed by the seven Ministers of Agriculture who comprise the Comité Internacional Regional de Sanidad Agropecuaria (CIRSA). A technical advisory committee to CIRSA, composed of the directors of plant sanitation, make recommendations on procedures and programs for consideration by CIRSA. This organizational pattern provides PROMECAFE/OIRSA with a channel for presenting recommendations as to acceptable residue levels, as well as a framework for standardizing the use and registration of pesticides.

PROMECAFE/OIRSA will sub-contract with ICAITI or other agreed to laboratories, for analyzing materials collected from the efficacy studies. ICAITI has experience in this type of analysis and has laboratory facilities equipped with chromatographic and other laboratory equipment to conduct the work.

PROMECAFE/OIRSA will compare the analysis data to the international standards recommended by the CODEX Committee on Pesticide Residues and/or the USEPA standards, and recommend adoption of the CODEX or USEPA standards by each country in order to achieve regional and international uniformity.

If results of the analyses reveal residue levels of any pesticide in excess of recommended international standards, they will recommend to CIRSA uniform regulations on the use pattern of those chemicals which will prevent unacceptable residue levels. Since coffee is primarily an export crop and failure to act could adversely impact on sales, it is presumed that CIRSA will adopt the recommended regulations.

To develop a broad base of understanding, PROMECAFE/OIRSA, in cooperation with ICAITI and national groups, will provide seminars and short-courses to national groups on the needs and procedures for standardization of regulations and registration of pesticides. They will also prepare a series of training materials on the proper use of pesticides to be used by national field personnel and in promotional campaigns.

In addition to the specific objectives related to coffee pests, it is anticipated that the operating procedures and methodologies developed under this project activity will provide the framework for establishing a regional system for residue analysis and control/registration of pesticides for other crop pests.

In support of this activity, the project will fund short-term specialists in pesticide chemistry and pesticide registration to augment current PROMECAFE and OIRSA staff. In addition, funding for collection and shipment of samples, residue analysis, preparation of training and promotional materials and short term training will be provided under the project.

The principal regional contributions will be in their participation in the preparation of training materials and in the conduct of short-term training.

The national institutions will provide the training support costs for their personnel as well as training facilities.

Residue Analysis  
Summary Cost Estimates  
US 000's

	AID P/M Amt	Counterpart		Total Amt
		Regional Amt	National Amt	
Short Term Specialist	16 130			130
Technical Personnel		130		130
Support Personnel		19		19
Logistical and Administrative Support		15		15
Travel and Perdiem		31		31
Supplies & Equipment (Spraying)	10			10
Training Seminars	31			31
Residue Analysis	116			116
Sample Collection/ Shipment	24			24
Computer Time		4		4
Publications		5		5
<b>Total Residue Anal- ysis</b>	<b>16 311</b>	<b>204</b>		<b>515</b>

#### 4. Development and Reproduction of Resistant Varieties

This component will seek to identify new varieties of coffee that combine the characteristics of rust resistance, high yields, and good quality and to multiply, as rapidly as feasible, those varieties that perform at acceptable levels.

In order to achieve these objectives, PROMECAFE/CATIE will take the lead in screening and identification of promising varieties. Fortunately, CATIE has been engaged in coffee research for many years and has one of the world's best collections of coffee varieties.

However, because of the absence of coffee rust in Costa Rica, where CATIE is located, and historically its absence from the region, CATIE's research has focused on cultural practices and production characteristics such as yield, quality of berry, and size and form of tree. Nevertheless,

CATIE has shipped limited amounts of seed of a few selected varieties to international institutions to screen for rust resistance and has in the past distributed limited quantities of seed from resistant varieties within the region. However, a recent test of ninety plants collected from material previously reported as rust resistant was found to be non-resistant. The cause of this apparent breakage in resistance is not presently known and may represent a mix-up in seed selection rather than a true break in resistance. However, it demonstrates the need for rechecking resistant stock already in the region as well as for establishing procedures for documenting, screening and tracking of all resistant materials, including acquired germplasm as well as materials selected at CATIE and within the region.

In order to expand the rust screening program, PROMECAFE/CATIE will execute a formal working agreement with the University of Vicosa in Brazil to subject up to 500 selections per year to the screening procedure. Also, in order to identify more broadly resistant varieties, those selections that demonstrate resistance to the 5 races of rust in Brazil will be sent to the Center for Coffee Rust Research (CIFC) in Oeiras, Portugal for screening against all known races of rust. A working agreement between PROMECAFE/CATIE will be executed with CIFC to formalize the arrangement.

It is anticipated that seed or plant materials of varieties sent for screening will not be returned from Brazil or Portugal, since the parent material will remain at CATIE. Rather, only written reports as to the degree of resistance will be provided. However, there is a need for the importation of seeds or planting materials of new and promising varieties from other countries, including perhaps breeding lines showing excellent resistance now available from CIFC and other institutions. To ensure such materials are safe, PROMECAFE will arrange for the continued cooperation of the USDA/APHIS to inspect and certify that the materials are pest and disease free before shipment to the region. USDA/APHIS has performed this third country role to facilitate safe movement of coffee germplasm among countries for a number of years.

Although CATIE will take the lead in the initial selection of promising varieties, both PROMECAFE and CATIE will be cooperatively involved in most activities of this component. Both will play a role in the introduction of new germ-

plasm, the distribution of experimental seeds or plants to national entities and in sending materials to international institutions for testing. Both will be involved in providing assistance in the design, monitoring and reporting of cooperative field trials with the national research groups and both will participate in development of training manuals and in providing on-the-job and short-term training courses for national level technicians.

As promising varieties and individual plants are recognized at CATIE, seeds and/or young plants will be distributed to national research groups for testing at a limited number of representative field sites. The field trials will assess adaptation and production qualities, as well as rust resistance where the plants are exposed under local conditions. At the same time seeds of the selected plants will be sent to Brazil for screening of rust resistance. This procedure will offer a significant time saving since those selections demonstrating resistance against the five races of rust in the Western hemisphere will already be under field testing in the national trials. As reports of resistance are returned from Brazil, and later from CIFC, PROMECAFE/CATIE will provide the information to the national entities. With this information plus the performance data collected in the field studies, the national agencies will eliminate the non-promising varieties and initiate multiplication of the desirable varieties in their own nurseries. PROMECAFE/CATIE will provide technical assistance to national agencies in techniques of multiplication, both by seed and vegetative propagation, and procedures for pedigreeing and monitoring the propagated stocks. (The process described is illustrated in Figure 2).

Field monitoring at the national level will also involve identification of promising plants, seeds from which will be submitted to PROMECAFE/CATIE for including in the rust screening program.

Recognizing that the substitution of susceptible varieties by resistant ones would be a lengthy process through multiplication by seed, CATIE is also working on asexual reproduction of coffee plants using traditional vegetative propagation methods (cuttings). This method, however, is also relatively slow and labor intensive and a more rapid, lower-cost method of multiplying desirable plants is needed.

A promising procedure and one with which CATIE technicians are modestly familiar is tissue culture. This method involves the use of cultured leaf explants sequentially cultured in a series of media under carefully controlled conditions, to produce plants genetically identical to the parent. The advantages include the ability to produce many more new plants in less time, in a sterile environment, virus free and using much less space. To encourage refinement and use of this new technique the project will assist CATIE by financing facilities, equipment and short-term technical assistance.

Upon completion of the project it is anticipated that there will have been identified at least two or three varieties possessing resistance to local races of rust and that are adapted to local growing conditions. It is also expected that systems and procedures for selection, recording, tracking and screening of desirable varieties will be in place in each country as well as propagation programs by both sexual and asexual methods.

The information generated from the cooperative national field studies, the regional research and the international screening program will be organized and stored in the regional data bank at IICA and/or CATIE in order to contribute to development of a repository of reliable coffee breeding information. The project will provide funding to assist in storage and retrieval of the data/information.

In order to undertake the additional research, the project will finance a long-term senior plant breeder, a short-term tissue culture specialist and three local contract assistants to work with the CATIE core staff. In addition, PROMECAFE will assign a senior plant pathologist and a coffee agronomist on loan to them to work with the CATIE plant breeder in selecting, pedigreeing and propagating promising varieties. Also, an internationally known Professor emeritus of coffee genetics will be made available by PROMECAFE to assist in procurement of promising new germplasm from international coffee institutions throughout the world. CATIE will contribute, on a half-time basis the services of a senior plant physiologist and two full-time support staff as well as consulting services from core staff representing other relevant disciplines. These regional personnel will provide technical assistance to national research groups and participate in project sponsored training activities.

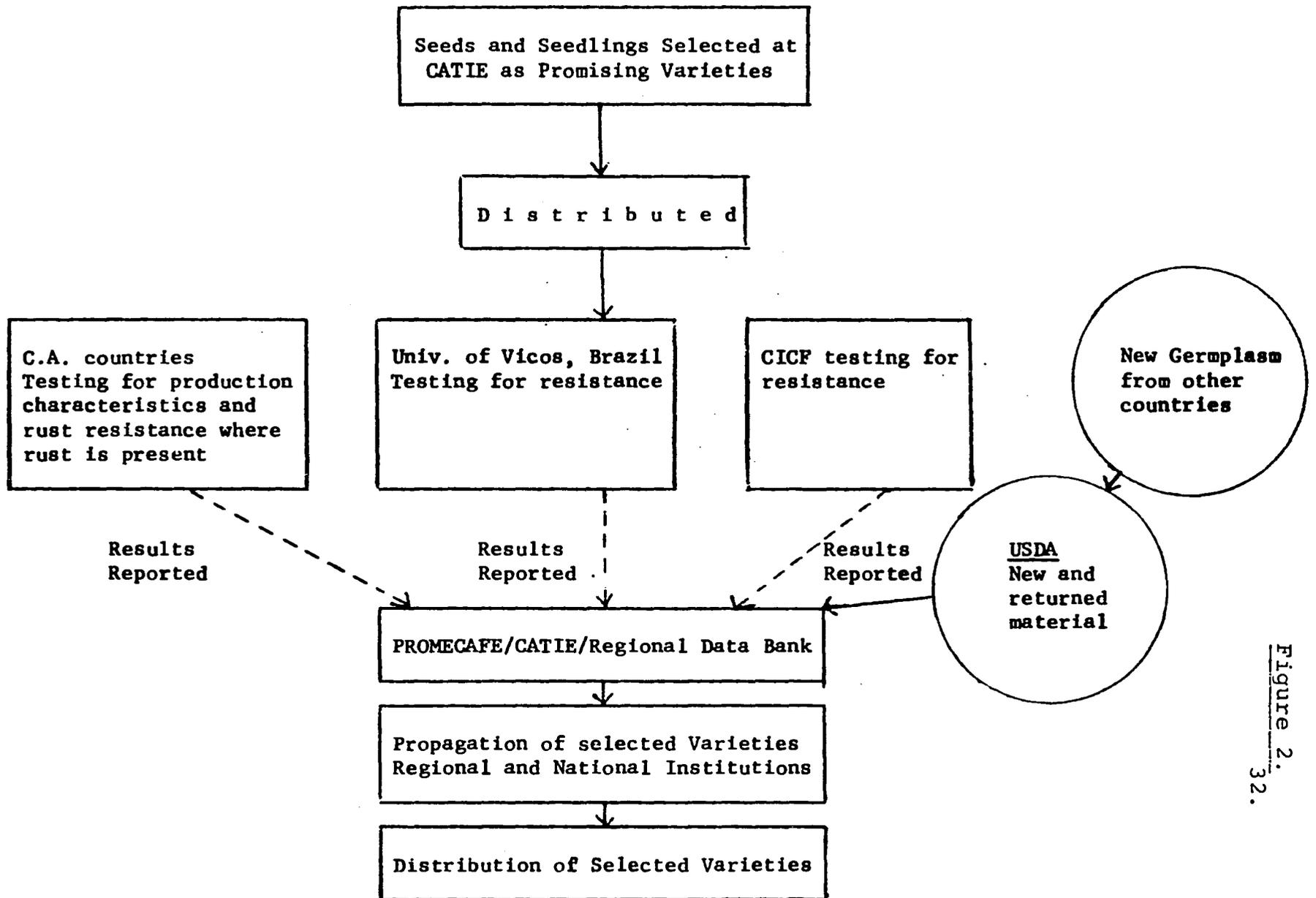


Figure 2.  
32.

The project will also fund specialized short-term training of national research technicians in Brazil and Portugal on the techniques of identification of races of rust, screening procedures and field trial methodology of rust research.

In addition to personnel and their support, the project will finance procurement and operation of a vehicle (pickup), a laboratory and equipment for tissue culture, small scale coffee seed processing equipment, a greenhouse, funds for pedigreeing, processing and distribution of seed and the costs of screening for rust resistance in Brazil and Portugal.

CATIE will provide the use of land for research and reproduction, their coffee variety collection, and the use of their computer, laboratories, classrooms, and office space for the extra staff.

The national research agencies will provide field teams, their logistical support, field study sites, training facilities and training support costs for their personnel. The details of inputs are shown in the financial plan but a summary cost estimate of this component is as follows:

Development and Reproduction of Resistant Varieties  
Summary Cost Estimate  
US 000's

	AID		Counterpart		Total
			Regional	National	
	P/M	Amt	Amt	Amt	Amt
Long Term Specialist	36	140			140
Short Term Specialist	6	51			51
Technical Personnel			363	387	750
Support Personnel	72	53	19		72
Laborers			17	159	176
Logistical and Administrative Support			38	54	92
Travel and Perdiem including Vehicle Maintenance & Oper.		61	29	113	203
1 Vehicle & Laboratory Equipment & Materials for Tissue Culture		51			51

Greenhouse Construction	80			80
Laboratory Construction for Tissue Culture	42	24	82	148
Short-Term Training at Vicosa and CIFIC	132	4		136
Progeny Testing at Vicosa and CIFIC	217			217
Pedigreeing/Processing and Distribution of Seeds	133	12		145
Computer Services		4		4
Publications		5		5
Total	114 960	515	795	2270

##### 5. Development/Adaptation/Extension of Appropriate Technologies

This component is a major project activity aimed at using results from the research activities to develop sound technification and pest control (rust and broca) programs appropriate for application by small to medium-small coffee farmers,

Initially, PROMECAFE, with the participation of CATIE, OIRSA and host-country research institutions, will put together several packages of recommended agronomic and pest control management practices, based upon existing knowledge, for verification on selected pilot sites representing the principal agro-ecological coffee producing zones and typical small to medium-small producers. As results from the specific research components as well as feedback from the verification studies of technology packages become available, the recommended technification programs will be refined.

The pest control recommendations will include what chemicals (fungicides and insecticides) and/or biological controls should be used, at what rates, when they should be applied and the best type of application equipment for different sizes of farms.

The cultural management packages will offer recommendations for shade control, fertilization, pruning and restructuring of existing trees to regenerate new fruiting wood, interplanting with better varieties to increase the density of plants from 1000 to 3000 to 5000 per manzana and soil conservation practices. The recommended packages will be tailored to fit different soil types, topographies, altitudes and climates to the extent possible within the limits of information available, recognizing that the recommendations will be modified as the knowledge base expands.

To ensure that technologies recommended are as appropriate as possible for small producers, they will be based upon area and farmer specific profile samples that describe production resources and constraints such as size of farm, topography, age of planting, spacing, water availability, labor availability, current inputs and management practices, credit availability, markets, etc. Host country agencies will develop the profiles with assistance from IICA/PROMECAFE technicians and the services of a short-term sociologist financed by the project.

In mounting this effort, PROMECAFE and the national agencies will apply the methodologies, systems, information and experiences developed by the ROCAP funded Agricultural Research and Information System (PIADIC) project with IICA and the Small Farm Production Systems (SFPS) project with CATIE. Analysis and interpretation of the profile data will be a joint effort by IICA/PROMECAFE, the national institutions and with the assistance of a short-term project funded systems specialist. The profiles developed will be added to the regional and national data/information banks to serve as benchmark information for future evaluations as well as a reference for the preparation of extension training materials.

A continuing coordinated effort involving PROMECAFE, CATIE, OIRSA and national level agencies will be carried out to incorporate new technologies developed over the long-term, e.g., resistant varieties and refined chemical control programs, into the technification recommendations.

It will be the responsibility of the national level agencies to make available appropriate field study sites, field teams and their support, and a major portion of the

necessary inputs to carry out the technification trials. PROMECAFE, with the cooperation of CATIE and OIRSA, will provide guidance in design of the studies and a monitoring/reporting system. In addition, PROMECAFE will arrange for four project coordinators who will devote at least fifty percent of their time to coordinating activities at the field level. Although they are budgeted under this component they will provide coordination for all national level activities to be carried out under this project. They will also make available improved planting materials for the field tests, limited other supplies, training materials and on-the-job training.

The project recognizes that implementation of an ambitious technification program will require strengthening the capabilities of a number of national level institutions engaged in delivering information on improved practices as well as credit and other inputs at the farm level. To support this effort PROMECAFE will develop a variety of instructional materials and short-courses for pre-service and in-service training of national level personnel, including example material for training of small farmers. The project will finance the production of materials which will represent various levels of sophistication for use by extension agents, credit agents and producers. National level agencies will be responsible for duplication and distribution of materials developed for use at the producer level.

In recognition of the frequent turn-over of public sector employees, which consumes significant resources for retraining, and the standardized nature of many of the tasks to be undertaken, the development of instructional modules, including self-training sets, will be investigated within the limitations of available project funds.

Since communications represent a critically important element in the successful transfer of improved technologies, PROMECAFE will assign a full time staff specialist to this activity as well as a long-term project funded communication specialist. Based upon discussions with the Honduran project development personnel, it is anticipated that funding for the communications specialist will be shared between the regional and the Honduran project with the specialist attached to PROMECAFE. This cooperative arrangement will make it possible to provide needed assistance over a longer-time frame to the mutual benefit of both projects.

Implementation of this component clearly will require close cooperation by the national level agencies and the regional institutions. The principal responsibilities of the regional project are in developing solutions based upon research, to consolidate the results into appropriate recommendations and to assist national level agencies to improve their research and outreach efforts. The responsibilities of the national level agencies are to deliver the inputs provided by the regional project as well as to develop credit programs to support implementation at the farm level. The integration of the regional and national level programs represents a system that will make it possible for the small to medium-small coffee producer to remain viable despite the threat of rust and other pests.

Development and Adaptation of Appropriate  
Technology for Small Farmers  
Summary Cost Estimate  
US 000's

	AID P/M Amt	Counterpart		Total Amt
		Regional Amt	National Amt	
Long Term Specialist	27 102			102
Short Term Specialist	24 192			192
Technical Personnel		150	377	527
Support Personnel		14		14
Logistical and Admin- istrative Support	56	6	29	91
Travel and Perdiem including In-country travel	30	16	66	112
Facilities - Experi- mental Sites			37	37
Training & Materials	145			145
Profile Development (Computer)	28	3		31
Publications		4		4
<b>Total</b>	<b>51 553</b>	<b>193</b>	<b>509</b>	<b>1255</b>

6. Information Network and Data Bank Development

The objective of this component is to expand the quantity of coffee research data/information available to the regional and national research entities.

A substantial body of technical information on coffee pests and production techniques has been developed around the world. Access to this information is important in order to minimize duplication of research as well as to remain aware of new developments. In addition, there is a need to manage and analyze research data generated by the project within the region.

Computer based data and information systems already exist at IICA, and it has the capability to access world research literature and data through the FAO (AGRIS) and USDA (Agricola and CRIES) as well as the IICA (SINIA and AGRINTER) programs. However, at the present time the available information principally reflects the South and Central American regions and there is only a limited amount of information on coffee production. This activity, therefore, will collect, update and store global and regional coffee research and production data/information and make it available to personnel of the regional and national institutions. Special bibliographies will be produced to support project activities.

Programs now in place at IICA, and designed for installation at CATIE, will allow interfacing between CATIE data (variety trials and technification models) and other coffee research information accessed from, or analyzed by, IICA. Information from the national level research, including natural determinants and socio-economic surveys, will be combined with regional level generated data to develop regional information sets. Special numerical and spatial programs now installed at IICA and CATIE will be used to manage and analyze research data generated by and for the project. Analyses of national level research results can be done centrally at IICA or at the national level where SAS or SPSS programs are operational.

The project will continue to use the IICA/PIADIC developed standards, norms, codes, systems, software packages and input formats. The experiences gained in data collection, storage, recall and analysis under the IICA/PIADIC and CATIE/SFPS projects should allow this activity to move ahead with a minimum of problems.

PROMECAFE will arrange for IICA to provide national and regional leadership in the management of documentation and dissemination of information through its normal regional

programs which will require inputs from IICA/CIDIA staff equivalent to two person years of professional staff time.

The project will provide limited financial support to assist in the collection, storage and analysis of data and documentation and these funds will be programmed through PROMECAFE to fill gaps not adequately addressed by current regional activities. A summary cost estimate is as follows:

Information Network  
and Data Base Development  
Summary Cost Estimate

	AID		Counterpart		Total Amt
	P/M	Amt	Regional Amt	National Amt	
Short Term Specialist	6	45			45
Technical Personnel			30		30
Support Personnel			3		3
Logistic and Admin- istrative Support		21	3		24
Travel and Perdiem			5		5
Data Information					
Procurement		38			38
Computer			2		2
Publications			3		3
Total		6 104	46		150

#### IV. Project Analysis

##### A. Technical Analysis

The importance of coffee production to small and medium-small coffee farmers, rural laborers and the Central American regional economy is described in the Economic Analysis and the Social Soundness Analysis of this proposal. An overview on the rapid spread and devastating potential of coffee rust within the region, a brief introduction to alternative responses and a discussion of the interest and commitment at both the national and regional level are reviewed in Part II, Project Background. Therefore, this analysis is devoted to examining:

- the appropriateness of the selected strategy and,
- the technical feasibility of the activities to be undertaken.

##### Appropriateness of the Selected Strategy

This proposed project is a relatively small but essential problem oriented research element in a comprehensive program to technify coffee production, including the integral activities for the control of coffee rust and broca.

Although the initial impetus for this proposal was the outbreak and rapid spread of coffee rust within the region, the results of a base study conducted by an inter-institutional team, including representatives from AID/W and ROCAP, concluded that effective coffee rust controls could not be economically undertaken unless accompanied by increased productivity to defray the added costs of control. This conclusion is supported by and explained in Part IV.B., the Economic Analysis section. Therefore, the focus of the project was shifted from rust control per se to technification (improved production practices) which includes control of both coffee rust and broca, another serious regional coffee pest.

Analysis of the problem indicated that additional research was needed if relevant, economic solutions to technification were to be developed, and that the research based solutions would be of minimum utility until they were introduced to and effectively implemented by small and medium-small farmers.

The strategy selected was to develop an integrated program employing the coordinated, combined efforts of national and regional institutions. The fundamental research activities, selected to support the requirements of technification, and project coordination will be centralized at the regional level. In addition, an important aspect of the project will be field studies and verification trials cooperatively conducted at the national level in order to tailor the technification packages to representative agroclimatic areas of the region. The national entities will be responsible for extending the research based technologies and improved planting materials to the farm level. However, they will receive training and assistance from the regional institutions on design, and conduct of field trials as well as on methods of transferring technology to small farmers. A detailed explanation of the role of the various regional and national entities is provided in Part III, the Project Description.

This approach will minimize the duplication of effort by regional and national entities and maximize the output of scarce technical expertise, research equipment and facilities. It will be both time and cost effective. The joint participation of national level technicians with regional specialists will contribute to development of an improved cadre of national expertise to sustain future research and development programs in coffee technification and pest control management at the country level.

In addition to project specific outputs, the integration of efforts from regional institutions having different responsibilities and professional skills will provide a regional framework and experience for institutionalizing the concept of integrated pest control programs applicable to other crops. However, the key ingredient of integrated pest control is information, whose acquisition is a slow and painstaking process based upon expanded multidisciplinary research programs. This project will establish the integrated systems concept but its future application to other crops will depend upon a greatly expanded information base generated by research.

It appears that an integrated national-regional approach is the most appropriate and cost-effective way to mobilize the limited available resources to serve all Central American countries,

### Technical Feasibility

This project is a "problem oriented" research activity aimed at developing an economically viable system of coffee technification, including coffee rust and broca control. The designed research activities are classified into three time frames as to when they should provide usable results. They are: (1) the short time frame (2-3 years); (2) the medium time frame (3-4 years) and (3) those more basic questions that will probably require a longer time frame (4-10 years). The planned activities by groups are as follows:

#### Short Time Frame (2-3 years)

1. Biology, etiology and epidemiology of the coffee rust fungus and national technicians trained to monitor the incubation cycles.
2. Control of broca.
3. Efficacy of copper based fungicides (i.e., dosage rate, timing, number of applications, methods of application and evaluation of additives).
4. Evaluation of spraying equipment.
5. Formulation and initial testing of improved production package (e.g., control of shade, fertilization, water, pruning, spraying, etc.)
6. Development of socio-economic profiles of regional coffee farmers.
7. Expansion of the regional data/information bank.

#### Medium Time Frame (3-4 years)

1. Efficacy of systemic fungicides and other pesticides.
2. Pesticide tolerance and residue analysis for new pesticides, particularly systemic fungicides.
3. Recommendations for pesticide registration and use.

4. Development of appropriate methods for technology transfer to small farmers,

#### Long Time Frame (4-10 years)

1. Development of high yielding, rust resistant varieties,
2. Multiplication and distribution of improved varieties.

To support the technical activities the project will include development of an expanded data/information bank, including both global and regional information on coffee production, the development of instructional materials and systematic training of national level technicians.

The technical feasibility factors considered in the design of each major research activity are reviewed in the following sections.

#### Eradication and Isolation

A detailed review of the history of coffee rust and experiences from other countries led to the conclusion that no single approach would be successful. Once coffee rust is introduced into a region it is only a measure of time before all areas become infected. Eradication efforts in Nicaragua and establishment of extensive barriers free of host plants in Brazil proved ineffective. Therefore, it was concluded that the technical activities must be directed to developing controls rather than attempting isolation or eradication.

#### Chemical Control

Although there are logistical and economic problems associated with chemical control of rust, it offers a proven available solution. Research in Brazil demonstrated that applying four applications of 5 Kg. of copper oxychloride per hectare will reduce rust infection to approximately ten percent, a level that permits good management to obtain acceptable yields under their agroclimatic conditions. However, the additional cost of the

chemical was not economically feasible on low-yielding traditionally operated coffee farms, characteristics of many small operations. A similar conclusion was determined for the Central American region.

Research results from a number of sources confirm that the epidemic progression and effect on yield varies greatly between agroclimatic areas and different cultural management regimes. Because water is essential for spore dispersal and germination, the spread of rust is dependent upon rain. In dry conditions the overall level of the disease is greatly reduced. Temperature is another important factor in rust epidemics because it influences the time between succeeding generations of the fungus. It appears the ideal temperature range for rapid incubation is 21°C to 25°C. Below 15°C and above 30°C, little development of the fungus occurs. Contrary to what might be expected, it has been reported that despite rain and high humidity, temperatures of 30°C and above retard development and cause premature rupture of rust postules.

In addition to climatic factors, the severity of infection and in turn yields were influenced by the level of shade, stage of plant growth and fruiting cycle, nutritional condition of the plants and the timing and mode of application of sprays. Full light exposure appeared to reduce the level of infection. When crop yields were high, infection was high but dropped rapidly following harvest. Poorly fertilized plants were more intensively infected but excess potassium appeared to accelerate the spread of the disease. In some agroclimatic areas 3 Kg. of copper based fungicide were as effective as 7.5 Kg. and in some areas four applications were as effective as six and eight. The timing of the fungicide application is obviously of critical importance. The Brazilian results indicate that the first, and most important, application should be made at the end of the dry season. The timing and frequency of subsequent applications should depend on the climatic conditions and the related germination cycle of the rust.

In summary, existing research results indicate that additional research, including site specific studies, is necessary if chemical control is to be effectively and economically used. The biological properties of the specific races of rust present must be studied under controlled

conditions to provide parameters for field studies. Mean minimum and maximum diurnal temperatures and rainfall data must be collected at representative sites and their influence upon the epidemiology of the local races of rust determined. Efficacy data, i.e., dosage rate and number and timing of applications, must be determined for different fungicides under different climatic conditions. Systemic fungicides should be investigated since they may offer superior protection, fewer applications and the possibility of being applied to the soil in granular formulation, a system that would be especially beneficial for small operations,

Since small farms are a prime concern, the efficacy studies should also evaluate the relative cost and efficiency of various types of application equipment such as backpack sprayers, motorized backpacks, ultralow volume units and others,

Although copper based fungicides have no tolerance restrictions under USEPA regulations, investigations of other fungicides (and other related pesticides) necessitate a determination of pesticide residue levels in the fruit to ensure that levels acceptable to importing countries are not exceeded under practices recommended. Determination of coffee residue data in conjunction with the chemical efficacy studies of both rust and broca control will be undertaken and serve as a basis for recommending uniform registration and use regulations in the Central American countries.

#### Resistant Varieties

Despite the availability of effective chemical controls of coffee rust, the development of resistant varieties is the optimal long range solution to the problem. Resistant plants would reduce the cost of production as well as being environmentally desirable. They would be especially beneficial for the small producer having limited access to additional capital inputs,

The design of this activity recognized that selection and/or development of resistant varieties is a difficult, time consuming task which requires the involvement of resources external to the region. That local selections found resistant to the race(s) of rust currently in the region

may not be resistant to a mutation of the pathogen is well understood. Therefore, the project will send local coffee selections to Brazil and Portugal for screening against multiple races of rust as well as procuring resistant germplasm from those and other countries. The screening in Brazil will involve the five races of rust currently in the Western hemisphere while the screening in Portugal will involve all currently known races of rust.

The local selections showing rust resistance as well as new introductions of resistant germplasm will be evaluated for yields in different regional localities. This will be done in cooperation with national units as described in the project description. Results from other countries have recorded great variability in the adaptation of coffee germplasm to new ecosystems, not only in yields but in agronomic characteristics such as vegetative growth, branching pattern, plant height, fruit size and shape and maturation period. Generally, the yield of resistant alien germplasm has been lower than the best local varieties but a few of the new selections have usually demonstrated a favorable genotype-environment interaction with certain local ecosystems. These few favorable selections will be multiplied for local distribution as well as being blended into a composite cultivar for additional testing at multiple sites.

The objective is to identify multiple sources of resistance. In this manner, as adapted resistant varieties are, overtime, released to farmers, the total plant population will have several genetically different sources of resistance. With that situation, a significant portion of the coffee population should remain resistant in the event a new mutation of rust appears.

Two additional related areas will be closely monitored even though they are not currently included as project activities. These include the relatively new studies on hybridizing of vertical resistant varieties and the efforts to develop horizontal resistance. Vertical resistance to specific physiological races of rust is determined by single dominant major genes, whereas horizontal resistance is considered to be attributable to polygenes or a few non-dominant genes. The hybridization is being investigated to determine if certain combinations will provide hybrid vigor

which could add significantly to improved adaptability and yields. The horizontal resistance is a highly desirable goal since it would prevent large losses in yields due to the rise of new races of rust.

In order to minimize the possible introduction of new races of rust, as well as other pests, all introduced germplasm will be passed through the USDA Animal and Plant Health Inspection Service (APHIS). This is an established procedure which will be continued.

The design of the project also includes an activity for reproducing coffee plants by tissue culture. This is a relatively new area of study but the research by Dr. Sondahl, et al, at the Instituto Agronomico in Campinas, Brazil, has demonstrated that somatic embryos and full plants can be obtained from leaf and stem explants of *C. arabica*. Since this process can be used to greatly accelerate reproduction of plants identical to the parent, and in a disease free state, it will be assisted under the project.

#### Control of Broca

The coffee bean borer (*Hypothenemus hampei*), commonly called broca is the second most serious coffee pest in the region. Although currently limited to Guatemala, Honduras and Mexico, it is being identified in new areas each year. The larvae phase matures inside the coffee fruit, resulting in worthless or light weight, low quality coffee which cannot be exported.

Because of its increasing importance and the focus of the project on technification, which involves addressing all constraints to improved production, the control of broca is included as a research activity.

Evaluation of the effectiveness of pesticides applied on representative affected field sites are necessary to identify minimum levels of pesticides needed for control of the broca. Promising biological controls will also be evaluated as well as cultural management practices such as orchard sanitation. These studies will be cooperative efforts involving both national and regional entities. The research results should lead to a recommended integrated control program for broca.

Residue analysis of fruit samples, similar to those to be conducted in the chemical control of rust, will provide information needed for recommending registration and use regulations to the national governments.

### Technification

The use of chemical controls in the short term and resistant varieties in the long term can provide effective rust control in Central America. However, to make the application of control measures economically feasible, especially for small traditional operations, yields must be significantly increased through the application of modern production practices. As additional investments are made to control rust, it also becomes increasingly necessary to minimize losses to other pests that would decrease the return from the investments made to control rust.

Technification as used in this project means the application of modern production practices. It includes the reduction and control of shade; increased levels of fertilization, organic or inorganic, consonant with the soil fertility needs of the site; soil conservation practices; pruning and restructuring of the coffee plantation; increasing the density of plants from 1,000 to 3,000-5,000 per manzana; systematic monitoring to detect pests; spraying to control rust, broca and other pests; and gradually replacing older rust susceptible varieties with higher yielding varieties and with adapted resistant varieties as they become available.

Much of the basic information needed to improve coffee culture has been generated by research in Central America, Puerto Rico and other areas that produce C. arabica. Research in Puerto Rico demonstrated that yields of 1,500 to 3,000 pounds of coffee per acre (1685 to 3370 Kg/Hectare) could be consistently produced with the application of modern practices. Maximum yields were obtained with heavy annual applications of fertilizer and no shade, using a ground cover to minimize soil erosion. Both soil and water losses were reduced greatly where ground cover was used to replace shade trees. Another important practice was in restructuring the plants to induce new growth. Coffee is borne on one year old wood and annual pruning, beyond removing suckers, broken branches, dead and diseased wood,

has resulted in reduced yields. However, when trees remain unpruned for 7 to 10 years the foliage becomes dense, disease levels increase, harvest becomes more difficult and costly and yields decline. By using a two-step renovation system rather than the usual stumping practice they were able to harvest 1132 pounds compared to 134 pounds during the two year renovation period. In Brazil, where they are concerned with replacing old trees with newer resistant varieties, they recommend the replacement of all trees after 14 years and preferably a gradual replacement to allow a plantation of mixed genotypes. This procedure will be encouraged in the regional project.

There is every reason to believe that the basic technology packages can be put together but they will need to be refined to fit specific areas and individual farm sites. The design of the project provides that field verification of the technification packages will be cooperatively planned and conducted by the national and regional entities. The regional institutions will provide guidance and assistance in design of the studies and the monitoring-reporting system. In addition they will provide improved germplasm, limited other inputs and on-the-job training. The roles of the national and regional groups are complementary and are described in detail in the project description section.

In addition to the technical research activities, the project provides for investigating various extension methods and techniques to determine the most effective procedures for delivery of the technification package to small farmers.

#### Support Activities

To support the research activities associated with technification and disease control, the project will include other closely related activities such as development of an expanded data bank and the development of training materials for systematic use in upgrading technical skills throughout the region.

The expanded data bank will collect, store and make available relevant information on all aspects of coffee production, including research from regions other than Central America. As individual country coffee projects are initiated, results from field studies and socio-economic data derived from area profiles of coffee farms will be

processed and added to the system. Every effort will be made to ensure that the regional and the national level data banks interface to ensure that national level entities have access to all available research findings.

The design of the project places great emphasis upon training in order to prepare the national level personnel to carry on the work of coffee technification after the project terminates.

In support of this, regional institutions will prepare training manuals and other instructional materials that will be used in systematic short-term training programs.

### Summary

In summary, the activities supported in part by this project are highly appropriate and in harmony with the goals of the regional countries and the objectives of A.I.D. assistance efforts. There is every reason to believe that the research planned will represent an excellent investment and contribute to finding both near term and long term solutions to problems of coffee production and disease control in the region.

On the basis of the above analysis, we conclude that the technical design of the project is reasonable and that adequate planning has taken place.

### Environmental Impact

Annex I presents the Initial Environmental Examination providing for a negative determination. It is our judgment that the research activities proposed in this project will contribute to improvement of the environment.

B. Economic Analysis; Benefit/Cost Analysis  
And Impact on Small Farmers \*

1. A separate benefit/cost calculation for the proposed project is not meaningful for two reasons: (a) benefits are not quantifiable in the area of research and institution building; and (b) this project is only part of a much larger coffee farm technification program. The proposed project does not stand by itself; indeed, it would fail to accomplish its purpose if the other parts of the program were not carried out simultaneously. Nevertheless, following presentation of the benefit/cost calculation of the proposed technification program<sup>1/</sup> which this project will support, we will present estimates of the impact on benefits and costs of introducing new rust resistant varieties on farms already technified.

The economic justification of the overall program is discussed under two headings: a macro-economic viewpoint which quantified the benefits in relation to costs derived from the coffee technification program accruing to the regional economy as a whole; and the micro viewpoint that focuses on the impact of the project on small coffee growers and landless peasants employed in the care and harvesting of the crop; and discusses the conditions that must be met to induce small farmers to technify and adopt rust control measures. The final section will deal with the impact on world coffee prices of the increase in the region's coffee production expected to result from technification.

2. Methodology Employed

a. The Case for Technification

Since the focus of this project paper is coffee rust and related coffee infestations, our original intent was to focus the benefit/cost calculation on an effective coffee rust control program.<sup>2/</sup> However, it became

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<sup>1/</sup>Explained below.

<sup>2/</sup>Since the cost of controlling infestations other than coffee rust is small in relation to coffee rust control, it can be included in the same benefit/cost calculation.

\* All tables referred to in this Economic Analysis are contained in Annex H.

apparent from conversations with C.A. government and coffee institute officials, as well as from analysis of cost and revenue data of small farmer operation, that the fight against coffee rust and other infestations must be considered an integral part of a comprehensive coffee technification program.<sup>1/</sup> As shown by the data shown in Tables 1A, 1B and 1C<sup>2/</sup> the cost of spraying against coffee rust is so large in relation to the value of output of the non-technified (i.e. low yielding) farm as to call into question the profitability of spraying for rust measures on such farms. The majority of small farmers are currently operating non-technified farms yielding 7-10 quintales (dry bean)<sup>3/</sup> per manzana. On the other hand, the available data demonstrates the high profitability of spraying on technified farms (see Tables 1A, 1B and 1C).

It was decided, therefore, to focus the benefit/cost calculation on a coffee culture technification program designed to raise average yields from 7-10 quintales (dry bean) per manzana to 30-35. In view of the fact that most coffee growers cannot afford the temporary reduction in production that the large scale uprooting of existing trees would entail, it was assumed that "technification" would take the form of planting additional trees (in addition to pruning, shading, application of fertilizers and fungicides, etc.); the uprooting of existing plants would be limited to those whose production is substantially below the average. It was also assumed that the land to be technified would include, in both El

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<sup>1/</sup>"Technification" refers to the combination of measures, including scientific pruning, shading, application of fertilizer, insecticides and fungicides, planting high-yielding rust resistant varieties as soon as they become available, and increasing the number of plants per manzana, so that average yields will increase from 7-10 quintales "dry bean" to 30-35 per manzana (1 manzana = .699 hectare).

<sup>2/</sup>These tables present revenue/cost calculations of spraying for coffee rust on non-technified (low yielding) versus technified (high yielding) coffee farms in Costa Rica (1A), Guatemala (1B) and Honduras (1C).

<sup>3/</sup>"Dry bean" is the translation of the Spanish "pergamino," meaning "parchment." It takes 1.20 to 1.25 units of "dry bean" coffee to produce one unit of green coffee ("oro" in Spanish).

Salvador and Nicaragua, the land already affected by coffee rust or that is exposed to the greatest threat.

b. Area to be Technified

In determining the acreage technification targets, account was taken of the goals that the C.A. countries have set for themselves. These targets were cut back whenever they appeared overly ambitious in relation to each country's commitment or its ability to finance and implement. Thus, Guatemala's goal of technifying 100,000 manzanas over the next five years was cut back to 50,000; while Nicaragua's expressed capability of technifying 10,000 manzanas a year was reduced to 6,000 owing to that country's problems in securing financing and trained personnel. The target suggested for each country appears below:

	<u>Acreage Target</u>	<u>Proportion of Total Area in Coffee Production</u>
Guatemala	50,000 Mz.	12%
El Salvador	20,000	9%
Honduras	40,000	23%
Nicaragua	30,000	24%
Costa Rica	35,000	31%
Panama	<u>5,000</u>	
TOTAL	180,000	

Since the total area planted to coffee in the region is 1,025,000 Mzs. the proportion to be technified is 17.5%.

c. Quantification of Benefits

There are three major sources of benefits resulting from the technification of coffee cultivation and the development of new rust resistant varieties and improved methods of rust control. First, there is the large increase in production on technified coffee land -- up from 5-8 quintales "oro" per manzana to 25-30.<sup>1/</sup> Second, the

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<sup>1/</sup>Equivalent to 30 to 37.5 quintales "dry bean" or "pergamino."

whole crop (on infested farms) would eventually perish without technification, since coffee rust control may not be profitable on low yielding non-technified farms; third, the introduction of new rust-resistant varieties to which this project should significantly contribute, would greatly reduce the cost of production on technified or semi-technified farms.

The value of the increased production projected to result from the technification of 180,000 manzanas over a five-year period is presented in Table 2. The assumptions underlying these projects are as follows:

(i) Production resulting from technification is zero in the first two years, five quintales<sup>1/</sup> per manzana in the third year, ten in the fourth and 25 in the fifth. Yields continue at that level thereafter.

(ii) Technification proceeds gradually over the five-year period 1981-85, as follows: 18,000 manzanas in 1981, 27,000 in 1982, 36,000 in 1983, 45,000 in 1984 and 54,000 in 1985.

(iii) The price of coffee (landed in New York) is assumed to be constant at \$140 per quintal.<sup>1/</sup> The projection of all benefits and costs is in terms of constant 1979 dollars.

The calculation is developed and explained in detail in Table 2. Note that the value of production on the technified acreage begins in 1983 (at \$12.6 million), grows to \$126 million in 1985 and reaches a peak of \$630 million in 1989. We have projected it to remain constant thereafter.

#### d. The Costs

Estimates of costs of technifying a manzana of coffee land was obtained for four of the six C.A. countries. The total cost of technifying and operating a

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<sup>1/</sup>Green Coffee or "oro." (One quintal "oro" is equal to 1.20 to 1.25 quintales "dry bean" or "pergamino"). One quintal is 100 lbs. and a manzana measures .699 hectare.

manzana over the three-year technification period are as follows:

Costa Rica	\$3,969
Honduras	2,925
Nicaragua	4,000
Guatemala	1,880

We have chosen to use Costa Rica data because it is the most detailed data available and because its use is likely to impart a conservative bias to our B/C calculation. To this cost estimate (detailed in Table 3) we have added provision for expansion of the research and extension capability of the public sector to enable it to reach the small farmers. The supplementary public sector budget, presented in Table 4, makes allowance for a substantial increase in the number of extension workers and research technicians, for the equipment, fuel and material that they would require, other operating costs and for the cost of education campaigns. The supplementary public sector budget for the region as a whole comes to \$8.5 million annually over five years, or a total of \$42.5 million over the five-year period. The total cost per manzana to be technified is \$236 (see Table 4). Note that this public sector budget excludes the amount of credit that the public sector would have to provide to the private sector to enable the latter to cover the essential investment costs of the technification program, as this is essentially a transfer payment.

Projection of the total cost of technifying and operating 180,000 manzanas over 1981-95 is presented in Table 5. The major assumptions underlying these cost projections are as follows:

(i) The average cost to the private sector of technifying a manzana, including the cost of fertilizing, spraying against coffee rust and other infestations, caring for the coffee trees, harvesting and transport, is estimated at \$3,969 per manzana over a 3-year period as calculated in Table 3.<sup>1/</sup> This amount includes all

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<sup>1/</sup>On basis of 1979 data for Costa Rica.

operating costs, but excludes the additional budgetary allocations to the public sector to enable it to provide the expanded services required to reach the small farmer. When this item (\$236 per manzana) is added, the total cost of technifying (and operating) a manzana becomes \$4,205 over the total investment period. We have used the figure of \$4,200 per manzana in the benefit/cost calculation.

(ii) The cost of technification is distributed as follows over the 3-year period: first year 54%; second year 19%; third year 27%. This distribution follows the one projected by the Oficina de Planificación Sectorial Agropecuaria (OPSA) in an in-depth study published in June of 1979.<sup>1/</sup>

(iii) It was assumed that following technification, operating costs, including harvesting and transport costs, would be about \$1,260<sup>2/</sup> for the annual production of a manzana of green coffee ("oro").

### 3. Conclusion of the Benefit/Cost Analysis

The benefit/cost calculation for the period 1981-2000, expressed in millions of constant 1979 dollars, is presented in Table 6. The benefits and costs (estimated in Tables 1-5) are discounted<sup>3/</sup> to the present at an annual discount rate of 10%. Note that a 10% discount rate is actually on the high side since all projections in the benefit/cost calculation are in terms of constant 1979 dollars, i.e. the assumed 10% opportunity cost of capital represents a real rate of return, and is thus over and above the rate required to compensate for the general increase in the price level.

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<sup>1/</sup>DOC-OPSA No. 33, Programa de Mejoramiento de la Producción de Café en Costa Rica, June 1979, Table 2, Page 19.

<sup>2/</sup>The average annual cost to the farmer of producing dry bean coffee ("pergamino") on technified land was estimated at \$1,171 per manzana in Table 1A. However, since our Benefit/Cost calculation is in terms of processed green coffee ("oro"), the processing cost of \$90 per manzana must be added (\$1,171 + \$90 = \$1,261. See footnote 3 of Table 5 of the Economic Analysis Annex).

<sup>3/</sup>The discounting procedure is used to determine the present value of a future stream of payments. The procedure is exactly the reverse of compound interest (which shows the future value of an amount compounded annually). The discount rate selected represents the opportunity cost of capital, i.e. the amount that the capital invested in the project could have earned elsewhere.

The total discounted stream of benefits over the 20-year period comes to \$2.69 billion, compared to total discounted costs of \$1.53 billion. The benefit/cost ratio of technification is thus 1.76 on the assumption of a 10% annual real rate of return.

#### 4. Sensitivity Analysis

For purposes of the sensitivity analysis, we need not assume a higher discount rate since a 10% real rate of return is likely to err on the high side. Instead, we have assumed a doubling of all costs of materials and fuel in relation to the price of coffee over the projection provided. The prices of materials per manzana used on technified coffee farms were assumed to be as follows (in Table 1A):

	(In constant 1979 dollars)
Fungicides	\$ 40
Fertilizer	194
Nutrients	11
Herbicides	27
Other Materials	<u>48</u>
	\$320
Transport Costs (\$5 per quintal on 30 quintales)	150

If we assume a 100% increase in the cost of materials and a 50% increase in transport costs in relation to the world market price of coffee, costs would increase by \$395 per manzana or by 31.3%<sup>1/</sup> and the benefit/cost ratio in Table 6 would decline to a still favorable 1.34 (see Table 7).

The above benefit/cost calculation relating to technification substantially understates the actual rate of return of a coffee rust control program. Note that the introduction of rust-resistant varieties and scientific

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<sup>1/</sup>\$395 over \$1,260.

rust control techniques on farms already technified or semi-technified would involve a much lesser cost than that involved in technifying a farm using traditional methods (which is the basis of our B/C calculation). On the other hand, the benefits would be the same in each case (i.e. yields of 30-35 quintales per manzana on technified coffee farms versus cessation of all production in the absence of coffee rust control). Thus, the B/C ratio would be higher than that shown above in the case of the introduction of rust control techniques on semi-technified and technified farms.

##### 5. Benefit/Cost of Introducing New Rust-Resistant Varieties on Farms Already Technified

The B/C ratio of introducing new rust-resistant varieties on farms already technified is extremely favorable. The cost of developing and distributing new rust-resistant varieties is estimated to be \$5.0 million (at most), spread over a 3-4 year period. Thus, the cost per technified manzana would thus be  $\frac{\$5,000,000}{180,000}$ , or only

\$28 over this period. Note that all other technification costs (planting, shading, fumigation, etc.) have already been allowed for as part of the technification program (Table 3). For already technified farms, the substitution of new rust-resistant varieties for the traditional ones that would have been planted to replace old or infected trees is thus a relatively inexpensive operation.

On the other hand, the saving effected by introducing the new varieties would be very substantial. We have estimated the average annual cost of spraying at \$100 per manzana (\$25 per spray for 4 sprays per year). The present value of a saving (or benefit) of \$100 per annum over 20 years discounted at 10% a year is \$851. Thus, the introduction of new varieties on already technified farms would be some 30 times the cost of developing and distributing the new varieties.

This very favorable ratio applies to technified farms only. The new varieties would not prosper without fertilization, shading and other care associated with high yielding technified farms.

## 6. Impact of Rust and Rust Control Measures on Small Farmers

Coffee rust is expected to have its most devastating effect on small farmers who generally have limited access to credit, operate non-technified farms, often take little or no care of their small acreage, do not apply fertilizer, insecticides or fungicides, and have little access to technical assistance. Yet, before the arrival of coffee rust and the sharp decline in coffee prices, these farmers were able to make a small profit.

The costs, revenues and profits on non-technified land (which is representative of small farm operation) before the onslaught of coffee rust are presented in Column 1 of Table 1A.<sup>1/</sup> Total operating costs on such farms came to about \$300 per manzana, gross revenues to \$560, leaving the operator a net profit of \$260.<sup>2/</sup> The average Guatemalan small farmer was estimated to realize a profit of about \$341 (Table 1B).

After arrival of coffee rust and the fall in coffee prices, the owner of a non-technified farm would find his profits much depressed. In Column 2 of Table 1A, we have illustrated what would happen if the farmer limited himself to spraying only and failed to technify. His total cost would rise to \$351, his gross revenues would decline to \$448 (it was assumed that he would lose about 20% of his crop as a result of coffee rust), leaving him a much smaller profit margin of only \$97 per manzana.<sup>3/</sup> Since the average small farmer has only 2 to 3 manzanas on coffee, his annual profit of \$250 to \$300 would be far too low to cover subsistence.

The data for Guatemala and Honduras support the same conclusion. After spraying for coffee rust, the

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<sup>1/</sup>For Costa Rica; approximations of the cost-revenue situation in Guatemala and Honduras are shown in Tables 1B and 1C.

<sup>2/</sup>Page 2 of Table 1A.

non-technified Guatemalan farmer would see his profit decline from \$341 per manzana (before rust) to \$29-\$153 now.<sup>1/</sup> (See Table 1B.) The Honduran farmer using traditional cultivation practices would see his profit shrink from \$210 to only \$39 per manzana as a result of the higher costs entailed by fumigation, along with some drop in yields resulting from rust which cannot be prevented altogether (see Table 1C). Small variations in the price of coffee or slight changes in cost estimates could easily cause the non-technified farm to operate at a loss. These data support the consensus among the C.A. coffee technicians that effective coffee rust control techniques are demonstrably profitable only on technified farms.

In Column 3 of Tables 1A, 1B and 1C, we have shown annual costs, revenues and profits following technification (i.e. after the technification program is completed). In the case of Costa Rica, the operator's annual costs would rise to about \$1,170 per manzana; but, with an average yield of 30-35 quintales "dry bean" per manzana, he would now produce coffee worth \$2,044 per manzana, leaving him a net profit of about \$870 (Table 1A). The internal rate of return on the technification program would be 23.2% p.a. on the basis of the Costa Rica cost data (for 1979), 10.8% for Guatemala and 36.2% for Honduras (see Tables 1B and 1C). Note that these rates of return are over and above the payment of wages, including imputed wages. These calculations illustrate the profitability of operating under technified conditions, as does the Cost/Benefit analysis discussed above in Sections 2 and 3.

The small coffee farmer hit by rust may be confronted with the following choice: shift his farm to some other crop; sell or abandon his land; technify. Spraying against rust without technifying may not be a viable option, at least not at the current low price of coffee.

To induce a significant number of small farmers to technify, a number of conditions must be met. Special

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<sup>1/</sup>Depending on whether labor is priced at the "shadow" wage or the actual legal minimum wage. The profit of \$29 corresponds to the legal minimum wage (see Table 1B).

provisions must be made to provide them with credit, technical assistance, and ready access to essential inputs such as fertilizer, insecticides, fungicides, and spraying equipment. Given the high cost of technification and the long waiting period before new coffee trees enter into production, the credit must be both substantial and medium-term. Repayments can only be scheduled to start after the fifth year because new trees will produce little before then.

AID's experience with small farmers in other countries suggests that under appropriate conditions, a certain proportion<sup>1/</sup> of small farmers can be induced to undertake the investments and needed improvements. Still, the obstacles should not be underestimated. Central American coffee experts point out that many small farmers devote only a small proportion of their holdings (and of their time) to coffee cultivation; they are not used to giving coffee much care; many farms are hard to reach, being high up in the mountains and far removed from roads. In Guatemala, there is, in addition, a language problem as many Indians speak only a local dialect. Moreover, the C.A. governments may find it difficult to provide credit and technical assistance in the required amounts.

In view of all these obstacles, it is clear that even under the best of circumstances, many small farmers cannot be induced to technify. The most likely to technify are those meeting the following characteristics: they have at least 3 or 4 manzanas in coffee; the farms have reasonably good soils and are accessible; the owners look upon coffee production as their main source of livelihood. The C.A. governments must, for their part, make a serious effort to provide the necessary conditions to minimize risk and give small farmers preferential treatment in the allocation of credit, technical assistance and other inputs. Given current budgetary constraints, adequate provision of these will most likely be contingent on the availability of long-term loans from the IFIs.

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<sup>1/</sup>Perhaps 20 to 30 percent.

## 7. Impact of Rust Control on Landless Farmers

In this project proposal, substantial attention has been given to small coffee farmers. The fact is, however, that the impact of the project on the employment of landless farm workers is likely to be much more important. According to available statistical information, the number of small coffee farmers in Guatemala and in El Salvador is about 41,500 and 34,600, respectively. Yet, the total estimated number of jobs<sup>1/</sup> in coffee farming in these two countries is conservatively estimated at 167,000 and 110,800, respectively (see Table 1 on The Project Background, Pt. II). Thus, there are 3 to 4 times as many landless workers employed on coffee farms as there are small producers. Failure to check coffee rust must therefore be presumed to have its greatest impact on landless coffee workers, particularly since some of the small coffee farmers might be able to shift to some other crop.

According to the best available estimates, the total number of wage earners in the region earning their livelihood directly from coffee is almost 500,000 and constitutes at least one-fourth of the total agricultural labor force (see Table 8). The 500,000 estimate excludes small farms and workers engaged in processing, marketing and ancillary industries.

## 8. Impact of Technification on Coffee Prices

We have noted that efforts to save coffee production by controlling rust and other coffee diseases through technification would not only save the crop but also lead to increased production. This raises the question as to the effect that this increase in output could have on the world price of coffee, and whether the increased production can be profitably sold given the current surplus of coffee in the world market.

In examining this question, three considerations should be kept in mind. First, coffee surpluses are

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<sup>1/</sup>With seasonal jobs reduced to a full-time equivalent basis.

usually a temporary phenomenon. The record of coffee production over the past twenty years shows that surpluses do not persist and are greatly affected by frosts which limit Brazilian production.

Second, Central America's current coffee production accounts for only about 12 percent of the world coffee supply. A 29%<sup>1/</sup> increase in the region's production resulting from the technification of 180,000 manzanas (as projected in the B/C analysis) would, at best, mean a 3.5% increase in the world's coffee supply. This could lead -- depending on the elasticity of demand and assuming that other factors are equal -- to a decline in price of approximately 6 to 8 percent. Since we have conservatively assumed a constant price of \$140 per quintal in the B/C analysis, the effect of this price change would be a decrease to about \$130 per quintal. If the B/C calculation was repeated at this price, it would result in only a slight drop in the B/C ratio, and the proposed program remains a profitable investment.

Third, and most importantly, it is doubtful that the region's total coffee production will in fact increase significantly over the next five years even with a costly and ambitious technification program. Such a program would only affect a fraction of the total area planted to coffee. Output on the non-technified area must be expected to decline, perhaps substantially, as a result of depredations from coffee rust. The region's total coffee production is thus more likely to decline than to increase, even under the best of circumstances.

<sup>1/</sup>The region's estimated output in 1979/80 was 9.5 million 60 Kg. bags, equal to 12.6 million quintales (of 100 lbs.). The additional production from 180,000 Mz. (assuming an average yield of 30 quintales per Mz. in lieu of the present 10) is 3.6 million quintales. Thus, the expected increase in production would be about 29%.

### C. Social Analysis

The Social Analysis of an AID project should answer two basic questions;

- 1) Are the members of the target group the principal beneficiaries of the project activities, and
- 2) Is the target group likely to adopt the innovations introduced by the project.

ROCAP has two concerns relative to this project; on one hand, small farmers should ultimately benefit; on the other hand, the macroeconomic problem of loss of income, tax revenues and employment in the region must also be kept in mind.

The importance of coffee production to the small and medium-sized farmer and to the rural labor force has been described earlier, as has the importance of coffee exports to the economy of Central America. We have also seen that the problem of coffee rust and its potential spread throughout the region is of such magnitude and complexity that major efforts are required by regional and national institutions, as well as the private sector, based upon a careful division of labor.

The regional role, in coordination with national and extra-regional institutions, is seen as:

- development of new rust-resistant varieties;
- testing of fungicides and other agrochemical products;
- integrated pest control techniques;
- analysis of residuals tolerance;
- survey and quarantine of coffee rust;
- socioeconomic studies of small farm producer problems;
- development/adaptation of appropriate technologies for the small coffee farmer.

National programs are then a necessary link between coordinated regional efforts, and provide the delivery systems necessary for technification and other control measures. The private sector has primary responsibility for implementation of the techniques and approaches developed by regional and national-level research.

A great deal of attention at the regional level is centered on research into coffee diseases, pesticide and fungicide treatments and residues, and the development of resistant varieties of plants. The information resulting from this research has application to a coffee operation of any size. The activity which directs the research results to the target group is the project component which seeks to adapt the technical recommendations derived from the research efforts, for communication to and application by the small farmer.

#### Description of Target Beneficiaries

##### Social Organization of Coffee Production

The target group includes small coffee farmers and laborers on coffee plantations.

In terms of coffee land distribution, Guatemala is at one end of the scale with 15.7% of the land in small farms owned by 92.3% of the coffee producers. Honduras and Costa Rica are at the other end of the scale with 72% of the land in small farms belonging to 93% of coffee producers. Data from Nicaragua indicate a size distribution somewhere between these poles, with 93% of coffee farmers owning 54% of the land. Data from El Salvador are difficult to obtain, given the current land reform situation; however, prior to the reform the structure of coffee production was closer to Guatemala's than Costa Rica. The AID target group in El Salvador includes the independent small coffee farmer and the agrarian reform farmer on expropriated large coffee farms. However, since data are not available and since the situation is currently in such a state of flux in this country, this social analysis will not describe the reform sector of coffee farms.

##### Profile of the Small Coffee Farmer

Small coffee farms can be grouped in three principal types, based on the size of farm. As in most typologies,

it should be recognized that one is dealing with a continuum of farms and that the types are somewhat artificial constructs.

#### Micro, Small, and Medium-Small Farms

The stratification adopted here is based on data from Guatemala, and the concepts can be extrapolated to other countries even though the exact farm size boundaries will vary somewhat. A study of coffee farmers in one municipality of Guatemala resulted in the definition of four technological levels based on a technological index. The index measures the percentage of farmers using 11 practices, described as follows, Micro-farms (Level 1) range up to 1 hectare (1.6 manzanas). Small farms (Level 2) range from 1 to approximately 10 hectares. Medium-small farms (Level 3) range from 10 to approximately 20 hectares.

Micro-farmers are coffee gatherers primarily, with coffee bushes scattered in with other crops, little investment of resources (either labor or otherwise), and with less than 10% of farms using shade control or some form of disease control,

Small farms are distinguished from micro-farms by a broader range of technological practices, including some use of seedbeds and nurseries, a very limited use of pruning and fertilization, but somewhat greater shade and weed control; approximately 20% of farmers use some of these techniques.

Medium-small farms use somewhat more seedbeds and nurseries; a significant amount of coffee varieties; some repopulation, chemical weed control, and soil analysis; significant amounts of pruning, fertilization and disease control; almost half engage in shade control; approximately 40% of all farmers in this category use some technification.

In terms of income, both the micro-farmer and the small farmer currently fall within the AID target population, typically earning less than the per capita income which defines the poverty group. The medium-small farmer is on the margin or somewhat above the poverty line; however, with a loss of trees to coffee rust he would quickly fall back into the target group. Thus, it is legitimate to consider them in

the target population since, without external assistance, they would swell the ranks of the target group after coffee rust hits them.

#### Access to Land, Labor, Capital, and Technology

The close correlation between farm size and technological level in all of the Central American countries has led most coffee analysts to believe that there is a causal relationship between the two: that smaller farm size causes lower technological levels. This hypothesis has been examined in a carefully controlled study by agricultural economists from IHCAFE in Honduras, who surveyed 286 farmers in the Santa Barbara coffee region. Their analysis shows that farm size is not a significant causal factor in explaining technological level whereas credit and technical assistance are significant. The alternative hypothesis, which is being explored in further research, is that farm size determines access to credit and technical assistance, which in turn determine technological level.

Micro-farms are net exporters of labor, as the farmer and his family members earn significant portions of their income in off-farm labor. Small farms tend to be self-sufficient in terms of labor, relying primarily on family labor with some hired labor during coffee harvest. Finally, medium-small farms hire significant amounts of labor from off-farm and non-family sources. Thus, labor is a significant constraint to the medium-small farmer who must compete with medium and large farms during coffee harvest.

In summary, access to land conditions, the access to credit and technical assistance for small coffee farmers, which in turn conditions technological levels. This picture, while admittedly static, sheds some light on the current low levels of technification for small coffee farmers.

#### Adaptive Strategies vis-a-vis Farm Type

##### Micro-Farmer; Diversification and Resistant Varieties

The micro-farmer is basically, as noted before, a gatherer. He has adopted no elements of technification and for him coffee is not a principal source of income. His motivation to risk what little capital and land he has to

go heavily in debt in order to technify will probably be minimal. On the other hand, it is almost impossible for national delivery systems to reach this type of farmer. When he loses his coffee trees to rust, he will likely be more willing to diversify rather than invest in coffee.

The technification strategy is not likely, therefore, to be a viable short-term solution for most micro-farmers, either in technical or social terms. However, when the new resistant varieties are available to these farmers they may return to coffee, since they will require a much lower level of investment per hectare. Thus, in the medium and long term, but not in the short term, resistant varieties are a viable option for this category of the target group.

#### Small and Medium-Small Farmer

Technification and control of rust through fungicides is the most appropriate short-term strategy for the small and medium-small farmer. These farmers are already familiar with the basic elements of coffee technology, so that diversifying to a crop with similar income-generating potential would be an even greater technification problem. Coffee has become a traditional crop for these farmers, and technification is feasible because they understand the basic practices.

#### Feasibility of Technification Strategy on Small Farms

##### Small Farmer Motivation

Small farmers already have an entrepreneurial approach to coffee and are thus motivated to technify. Their constraint is not motivational, but a question of access to the resources required for technification.

##### Farm Size and Levels of Technification

Given the incipient technification on the small and medium-small farms, it can be concluded that the size of farm is not in itself the constraint to adopting a technification strategy. With the appropriate access to the required knowledge and resources, there is reason to be assured that the technification strategy is socially sound.

### Capacity of National Delivery System

There is little cause for optimism at present in the ability of national delivery systems (including extension services, credit sources, and input delivery systems) to meet the needs of the small farmer target group. The PROMECAFE/ROCAP study is quite clear in this regard: no country in the Central American area has a well-financed program geared to the small producer. Thus, the country institutions need to improve and increase personnel, budget, and facilities to carry out a serious technification effort for small farmers (see CA Report p. 50). Even Costa Rica, which has probably the most advanced delivery systems for coffee of all the CA countries, has not been able to fully meet the needs of potentially technifiable small farms.

### Coffee Laborers as a Target Group

The largest portion of the target group in each country is the coffee labor force on medium and large coffee farms. This labor force is composed of two major subgroups: the resident plantation laborers and migrant harvest workers. Resident laborers are completely dependent on coffee; the effect of coffee rust on them would be to leave them completely unemployed. Migrant laborers are either landless or owner/operators of small subsistence farms, who earn a substantial portion of their yearly income in the coffee harvest.

While the total area in coffee may be reduced, the demand for labor per hectare increases substantially with technification. There are two reasons for this: first, most of the technification practices (pruning, shading, etc.) are labor intensive; second, the greater density of plants per hectare requires more labor, particularly during the harvest season.

The benefits accruing to migrant coffee laborers from the increase in coffee production will be substantial, since the labor generated is directly proportional to the amount of the coffee harvest. These benefits are not inconsiderable, since coffee harvest wages tend to be higher than the average wage for agricultural field labor in most CA countries.

## Analysis of Project Activities in Terms of the Project Target Group

### 1. Basic Research

The technical analysis demonstrates that research in the biological properties of rust is necessary in order to carry out the technification strategy. The etiology of coffee rust must be understood in order to apply rust control measures (copper spraying or systemic control) more effectively and efficiently. The coffee bean borer must be dealt with for two reasons: the reduction of productivity that results from the borer and the advantage of using integrated pest management approaches to deal with the borer and coffee rust simultaneously.

### 2. Adaptive Research

The development and testing of resistant varieties and the reproduction of these varieties are two adaptive research activities that will pay off in the long term, have a demonstrated direct relation to proposed Project strategies, and are useful for both large and small farmers while being particularly useful for small farmers. As noted in the PROMECAFE/ROCAP report, resistant varieties are especially beneficial for the small producer, as they can be managed with a minimum of attention (see p. 28 of the report).

As a long-term strategy, the resistant varieties should be seen as an option for small farmers in two situations: one, to allow micro-small farmers who have been forced out of coffee back into the crop in the decade following 1990; second, to reduce costs associated with chemical control for small and large farmers who will be replacing trees or expanding their coffee area during the same period.

The development/adaptation of appropriate technology for coffee production is explicitly designed to be targeted on small farmers exclusively. Research activities will focus on improved technology packages and on methods for effective transfer of the improved technologies. These technology packages will be developed with on-farm adaptive research techniques, thus focussing on problems that are unique to the small farmer's mixed cropping systems, specifically on the advantages/disadvantages of intercropping, the more

efficient means use of mineral fertilizer, the appropriate usages of fertilizer in the small farm situation, and soil conservation techniques.

These two activities are more demonstrably linked to immediate small farm problems particularly, and are more likely to produce results in the short-term. From the point of view of impact on small farmers, they are the critical activities of the Regional Coffee Pest Control Project.

The project description includes a pilot adaptive research activity to develop the technological packages for small farmers and simultaneously develop improved methodologies for extension services to deliver the packages to large numbers of small farmers. This pilot activity will be developed in one country and then disseminated to the other CA countries. On-farm adaptive research with regional applicability for small farmers does not require the establishment of activities in each country. As pointed out in the target group description, small farmers from different CA countries have similar sets of constraints. Thus, technological packages and delivery strategies developed for small farmers in any one of the CA countries can be applied with necessary modifications by the national institutions, to the small farm situation in other CA countries.

### Conclusions and Recommendations

The first conclusion of this analysis is that the technification strategy is sound for small and medium-small farmers, and that micro-farmers in the short term must diversify; although they can be reincorporated into coffee cultivation when rust resistant varieties become available. As in the economic analysis, this conclusion is arrived at by looking at the overall strategy, which includes substantial capital investment at the national level in addition to the regional research effort.

The second conclusion of the analysis is that the activities contained in the project description will benefit small coffee farmers. One principal type of benefit is the reduction of costs, by developing more efficient and effective applications of known coffee rust prevention technology in the short term, and in the long term by developing resistant varieties. The pesticide tolerance research and research into the biological properties of rust will combine to reduce

costs and minimize the ecological impact of rust control strategies. Research into the coffee bean borer will be oriented to integrated pest management techniques which will increase productivity in those areas affected by the borer.

The second type of benefit will be on the adaptation of rust control measures to the small farm situation, through the adaptive research strategy and technification packages, and the development of methodologies to deliver coffee rust control information to large numbers of small farmers. The pilot extension activity will develop methodologies and educational materials which are oriented to the small farmer situation, thus allowing national extension efforts to reach a larger proportion of the target group in a much shorter time.

#### D. Institutional Analysis

This analysis addresses two basic questions:

- What are the institutional capabilities of the organizations selected to implement the project and,
- What does the project contribute to strengthening their capabilities.

The project is predicated on the conclusion that modernization of coffee production, including disease and pest control, is the only viable response to the current coffee rust problem and the continued production of this important source of income and employment throughout the region.

The selected project design is an integrated problem oriented research effort that will take advantage of existing regional institutional capabilities. The project will provide resources which will permit an acceleration and expansion of on-going efforts to develop an integrated system of coffee technification and pest control.

PROMECAFE/IICA will serve as the principal coordinator and will be responsible for administration of the project. PROMECAFE, a program under the auspices of IICA, was created to promote research and development of improved technologies for coffee production throughout the region. This was in response to a felt need for greater cooperation and coordination of both regional and national efforts concerned with coffee production. The Advisory Council of PROMECAFE is composed of representatives of the member organizations with the Director of PROMECAFE serving as chairman. The two major regional research institutions, CATIE and OIRSA, and the regional Ministries of Agriculture and the national coffee institutions are members (signatories) of the program. Each member country provides \$40,000 per year to the support of the program and IICA, OIRSA and CATIE provide in-kind institutional support as needed. These interrelationships make PROMECAFE the logical choice for coordinating the project.

The five member core staff of PROMECAFE is judged to be well qualified and dedicated as demonstrated by the number of training courses offered and studies conducted for national groups (Annex J ). However, the current number of

staff is inadequate to coordinate and maintain its technical participation in the planned major expansion of research, training and monitoring activities at the regional level. To free the Director for coordinating technical functions, IICA will provide PROMECAFE a project administrator to manage the myriad details concerned with contracting personnel, procurement, records, accounting, etc. In addition, the IICA offices located in each country will be available to assist with administrative and logistical coordination at the country level and serve as a channel of communications as needed. IICA is also the site of CIDIA, the Inter-American Agricultural Documentation and Information Center which operates in conjunction with a number of relevant software programs and supporting hardware for the processing, storage and retrieval of pertinent agricultural data and information. These services will be utilized in developing the project related information network and data bank activity as described in the project description. IICA, which has a staff of approximately 300, is well qualified and adequately staffed to backstop PROMECAFE's role and the proposed support is consistent with IICA's objectives and regional responsibilities.

All project funds will be channeled through PROMECAFE/IICA which will recruit and contract the long-term and short-term specialists financed by the project. A number of the specialists, as identified in the project description, will be assigned to OIRSA or CATIE. The details of the financial arrangements, as well as definitive project responsibilities and counterpart contributions of personnel and resources will be contained in formal agreements executed between PROMECAFE/IICA and OIRSA and CATIE. Formal agreements will also be executed between PROMECAFE/IICA and each country to ensure a clear understanding of the responsibilities and contributions of each signatory. Execution of these agreements will be a conditions precedent to disbursement of grant funds.

In direct support of PROMECAFE's expanded responsibilities, especially in the areas of training, development of transfer methodologies and data/information storage and retrieval, the services of a communications specialist, a sociologist and a systems specialist will be financed by the project.

OIRSA, which will be responsible for the conduct of three project related research activities (Biology of the Rust, Control of Broca and Residue Analysis/Registration of Pesticides) is the operational organization of CIRSA, the Regional International Committee for Plant and Animal Protection. CIRSA provides policy guidance to OIRSA and is composed of the Ministers of Agriculture of the member countries. OIRSA is financed by annual quotas from member countries as well as grants from international organizations such as the United Nations. Although OIRSA has a staff of approximately 180, the majority are involved in activities associated with border control, inspection and fumigation rather than research. Nevertheless, they have been involved in surveying and trapping activities to delineate and improve methods for chemical control of the broca as well as investigations into biological control in which they have enjoyed some success. In addition, they are participating in programs for the control of the med fly and nematodes as well as conducting training programs for national level personnel. They also provide technical assistance in development of legislation concerned with plant protection, which makes them an appropriate instrument to address the project activity associated with registration and regulation of pesticides. However, OIRSA faces a number of constraints that limit an expansion of their research activities. These include a lack of adequate research facilities and a shortage of recognized senior level scientists. OIRSA's management is conscious of these factors and is seeking measures to address them. Relative to this project, these constraints will be ameliorated by augmenting their current core staff with a long-term senior level plant pathologist, a similarly qualified entomologist, and short term specialists in biological control, pesticide chemistry, and regulation and registration of pesticides. Their research facilities will be improved with the addition of laboratory equipment and greenhouses as well as equipment and support for the conduct of field investigations and chemical efficacy studies.

CATIE, which will play a key role in the project related research concerned with development of rust resistant varieties as well as a joint role in development of technification packages, is the region's principal agronomic research center. CATIE, created in 1973 from the former IICA sponsored "Centro de Enseñanza e Investigación" (CEI), has a

staff of approximately 60 well trained professionals of which about 50 are located at the Turrialba center. They have about 1000 hectares of land, one of the largest collections of coffee varieties and reasonably adequate research laboratories and training facilities. They also have a modest computer unit which is being programmed to interface with the IICA computer based data center. CATIE has been recognized as being in the forefront of focussing its interdisciplinary research approach on the problems of small farmers and has developed methodologies and techniques for bridging the gap between research and producers. The project will draw upon these successful experiences which in part have been developed under previous CATIE-ROCAP projects.

Despite its significant accomplishments, CATIE suffers from inadequate financial support to undertake the needed expansion and acceleration in coffee research. Nor can it be directly involved in testing for coffee rust resistance since it cannot introduce the pathogen into rust free Costa Rica. In response to these constraints, the project will make available in support of their current staff a long term senior plant geneticist, a short term specialist in tissue culture and limited additional support staff to undertake an expanded effort in pedigreeing and propagation of new planting materials for testing within the region.

PROMECAFE will also provide a senior level scientist to work with CATIE and jointly, CATIE and PROMECAFE will carry out the program with Brazil and Portugal for screening promising varieties for rust resistance as detailed in the project description. In addition to staff, the project will finance equipment, a tissue culture laboratory, greenhouse, the costs of screening for rust at the international centers and training of national level technicians, both within the region and in Brazil and Portugal.

To verify research results under local agroclimatic conditions and to adopt and extend technologies developed to small producers, the national level agencies must be involved. All of the countries are members of PROMECAFE and all have demonstrated a sincere interest in the project related activities. However, all face a shortage of well trained research personnel as well as resources for recruitment and training of any major expansion of research

and extension staff. Relative to these constraints, the project places major emphasis upon training of national level personnel, including on-the-job training provided by the regional specialists as well as systematic short-courses and printed instructional materials.

In addition, at least two technicians from each country will receive six months of specialized training in Brazil or Portugal in the identification of races of coffee rust, procedures for screening for rust resistance and field techniques in coffee research. The combination of formal and informal training for the national level staffs will prepare them to carry on the work of coffee technification after the project terminates. The project also will investigate and develop methodologies, techniques, and materials for more efficient transfer of new technologies to farmers. This will help alleviate the need for a greatly expanded extension staff at the national level.

In summary, the capabilities and limitations of the institutions having responsibilities for implementing the program have been evaluated and the project has been designed to strengthen the weaknesses and alleviate the constraints. It is our judgment that the combination of current organizations and project inputs are adequate to ensure successful implementation of the proposed activities.

FINANCIAL ANALYSIS AND PLAN

1. Summary Financial Plan

The proposed budget will total \$7.2 million. AID's contribution will consist of \$3.5 million in grant funds or 49% of the total project budget. The Counterpart contribution is composed of the regional organizations' contributions totaling \$1.6 million or 22% and the recipient governments and the participating coffee institutions contributions which amount to \$2.1 million or 29%.

The project's life is estimated to start May 1981 and expire May 1986 for a total of 60 months.

Funding will be provided over five fiscal years as follows:

<u>Fiscal Year</u>	<u>Amt. in Dols.</u> <u>(In 000's)</u>
81	350
82	939
83	820
84	881
85	<u>510</u>
TOTAL	3,500 =====

The financial plan, including estimated costs and funding sources is shown in Table 1 below. For detailed project costs of each project component refer to Annex K,

TABLE 1  
FINANCIAL PLAN  
PROJECTED COSTS (US \$000)

	<u>PROJECT COMPONENT</u>	<u>AID</u>	<u>COUNTERPART</u>		<u>TOTAL</u>
			<u>REG.</u>	<u>NAT.</u>	
I.	Biology of the Rust	619	265	555	1,439
II.	Control of Broca	379	353	214	946
III.	Residue Analysis	311	204	---	515
IV.	Dev. and Reprod. of Resistant Varieties	960	515	795	2,270
V.	Dev. and Adaptation of Approp. Technologies	553	193	509	1,255
VI.	Information and Data Base Development	104	46	---	150
VII.	Evaluation	60	---	---	60
VIII.	Overhead	164	---	---	164
IX.	Contingencies	<u>350</u>	<u>---</u>	<u>---</u>	<u>350</u>
	TOTAL	<u>3,500</u>	<u>1,576</u>	<u>2,073</u>	<u>7,149</u>

The projection of project expenditures by AID Fiscal Year and the costing of project outputs are shown in Tables 2 and 3, respectively.

TABLE 2  
PROJECTION OF EXPENDITURES BY FISCAL YEAR

(US \$000)

<u>Fiscal Year:</u>	<u>AID Total</u>
1981	100
1982	700
1983	800
1984	800
1985	700
1986	<u>400</u>
TOTAL	3,500 =====

TABLE 3  
COSTING OF PROJECT OUTPUTS

(US \$000)

COST CODE	PROJECT INPUTS	P R O J E C T O U T P U T S														TOTAL
		BIOL OF RUST		CONTROL OF BROCA		RESIDUE ANALYSIS		RESISTANT VARIETIES		APPROPRIATE TECHNOLOGIES		DATA BANK		TOTAL		
		I	COUNTER-PART	II	COUNTER-PART	III	COUNTER-PART	IV	COUNTER-PART	V	COUNTER-PART	VI	COUNTER-PART	AID	COUNTER-PART	
a)	Long Term Spec.	140	---	140	---	---	---	140	---	102	---	---	---	522	---	522
b)	Short Term Spec.	96	---	58	---	130	---	51	---	192	---	45	---	572	---	572
c)	Technical Pers.	---	461	---	350	---	130	---	750	---	527	---	30	---	2,248	2,248
d)	Support Pers.	72	19	---	19	---	19	53	19	---	14	---	3	125	93	218
e)	Laborers	---	144	---	57	---	---	---	176	---	---	---	---	---	377	377
f)	Logistical Admin. Support	---	58	---	53	---	15	---	92	56	35	21	3	77	256	333
g)	Travel & Per Diem and Vehicle Operation	61	86	61	67	10	31	61	142	30	82	---	5	223	413	636
h)	Suppl./Equip.	138	---	53	---	---	---	51	---	---	---	38	---	280	---	280
i)	Greenhouse	81	---	40	---	---	---	80	---	---	---	---	---	201	---	201
j)	Facilities - Experimental Sites	---	43	---	12	---	---	42	106	---	37	---	---	42	198	240
k)	Training & Mat.	31	---	27	---	31	---	132	4	145	---	---	---	366	4	370
l)	Progeny Testing	---	---	---	---	---	---	217	---	---	---	---	---	217	---	217
m)	Pedigreeing-Processing & Distribution	---	---	---	---	---	---	133	12	---	---	---	---	133	12	145
n)	Residue Analysis	---	---	---	---	116	---	---	---	---	---	---	---	116	---	116
o)	Sample Coll. & Ship.	---	---	---	---	24	---	---	---	---	---	---	---	24	---	24
p)	Profile Dev. Comp.	---	4	---	4	---	4	---	4	28	3	---	2	28	21	49
q)	Publications	---	5	---	5	---	5	---	5	---	4	---	3	---	27	27
	OVERHEAD	34	---	21	---	18	---	54	---	31	---	6	---	164	---	164
	EVALUATION	13	---	8	---	7	---	20	---	11	---	1	---	60	---	60
	CONTINGENCY	74	---	46	---	39	---	115	---	66	---	10	---	350	---	350
	TOTAL	740	820	454	567	375	204	1,149	1,310	661	702	121	46	3,500	3,649	7,149

The breakdown of AID contributions by Foreign Exchange and Local Currency is shown below in Table 4.

TABLE 4

AID INPUTS BREAKDOWN BY CURRENCY UTILIZATION

(US \$000)

<u>COST CODE</u>	<u>A I D</u>		
	<u>Total</u>	<u>FX</u>	<u>LC</u>
a) Long Term Specialists	522		522
b) Short Term Specialists	572	572	
d) Support Personnel	125		125
f) Logistical Admin. Support	77		77
g) Travel and Per Diem	223		223
h) Supplies/Equipment	280	130	150
i) Greenhouses	201		201
j) Facilities - Experimental Sites	42		42
k) Training and Materials	366	132	234
l) Progeny Testing	217	217	
m) Pedigreeing-Processing and Distribution	133		133
n) Residue Analysis	116		116
o) Sample Collection and Shipment	24		24
p) Profile Development - Computer Services	28		28
OVERHEAD	164		164
EVALUATION	60	36	24
CONTINGENCY	<u>350</u>	<u>109</u>	<u>241</u>
TOTAL	<u>3,500</u> =====	<u>1,196</u> =====	<u>2,304</u> =====

## 2. Contingencies, Overhead and Inflation

\$350,000 has been budgeted for contingencies. This is 11% of the total AID contribution before contingencies, and 10% of the total AID Contribution.

Overhead of \$164,000 to IICA has been calculated at 14% of the long-term and short-term assistance which AID is funding.

Inflation factors averaging 11% have been included in the respective budget line items and were calculated based on the current rate of inflation and the implementation schedule. The detail of inflation calculations may be found in the Financial Plan Cost narratives, Annex K.

## 3. Replicability

It is anticipated that the activities of the project will lessen in intensity after direct AID involvement. However, by that time, the short and medium term and many of the long term objectives described in the Technical Analysis will have been accomplished. The training funded by the project will insure that the expertise necessary to continue research and the application of research to benefit of the small coffee farmer will be available at the national level after the project funded technical assistance has ended.

It should be noted that this project is a unified expansion of activities which both PROMECAFE and OIRSA have been conducting. As most of the counterpart inputs, both regional and national, are in-kind, the project does not place a serious additional financial burden on the regional institutions or the national research agencies. From a financial viewpoint, these entities will be able to continue the activities which might be longer than the life of the project, such as the development and reproduction of resistant varieties, and the extension of appropriate technologies developed and tested under the project. It should be recognized, however, that the successful application of research results derived from this project will require

national level commitments to expand and improve their extension capabilities and to make sufficient credit resources available to permit small farmers to technify their coffee farms.

4. Because IICA is the chief implementing institution, a brief analysis of its financial viability is presented in Annex K.

## VI. IMPLEMENTATION PLAN SUMMARY

### A. Execution:

Upon signature of the project agreement, PROMECAFE/IICA will finalize separate agreements with OIRSA, CATIE, and ICAITI which will be a condition precedent to the disbursement of project funds to IICA. PROMECAFE/IICA will subsequently make arrangements for the procurement of one vehicle, laboratory equipment and other commodities. IICA will also begin to identify candidates for selected technical positions. Although these technical specialists will be IICA contract personnel, many will be assigned to work under the direction of either CATIE or OIRSA.

IICA will also sign individual working agreements with the national coffee institutes and/or the Ministries of Agriculture, depending on the country. These individual agreements will be a condition precedent to A.I.D. disbursement for project activities to be carried out in that country and will serve to insure the timely availability of national inputs such as counterpart technicians, land and laboratory facilities, and logistical support.

### B. Implementation:

The implementation of the project will follow the estimated timetable shown in Annex L , which chronologically outlines the major events of the project.

PROMECAFE, OIRSA, 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.

### C. Waivers:

The project proposes to finance the procurement of non-U.S. contract personnel where appropriate.

Most of the long-term assistance has been budgeted according to IICA's salary and benefit schedule to allow for the contracting of highly qualified Central or South American specialists. Budgeted amounts for short-term technical assistance will allow for the contracting of U.S. expertise.

This project will contribute to ROCAP's goal of strengthening Central American institutions by institutionalizing a regional system of coffee pest control. This requires the recruitment and hiring of qualified Central Americans and specialists from Code 941 countries, as appropriate, and supporting their activities in the field. Accordingly, a waiver of HB.l.b., per Section 5C.4a.2. is recommended to allow for procurement of services from Code 941 countries. The screening against multiple races of rust, in conjunction with training provided to Central American and Panamanian technicians will also require a waiver of HB.l.b. per Section 5C.4a.2. Plant material will also be screened against all known races of rust at CIFIC, in Portugal, together with short-term training which will be provided to Central American and Panamanian technicians. This will require a waiver of HB.l.b. per Section 5C.4a.2. to allow for procurement of goods and services from Portugal, a Code 899 country.

D. Project Administration:

This project will be monitored by the ROCAP Regional ADO assisted by the Assistant Regional ADO in Costa Rica. The PROMECAFE Director will direct the project and will be assisted by a Project Administrator, assigned to the project by IICA, who will be responsible for the logistical 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. There will be four country coordinators: one each for Guatemala and Honduras, one for both Nicaragua and El Salvador, and one for both Costa Rica and Panama. The coordinators will carry out administrative and logistical functions such as: coordinating the collection of data and ascertaining that information developed by the activities reach PROMECAFE; organizing in-service training courses for National counterpart personnel; and coordinating logistical support for field trips for project funded short-term specialists. As outlined in the Project Description section, OIRSA, CATIE and PROMECAFE will be responsible for the technical direction of their assigned activities.

E. Disbursement Arrangements:

All project funding will be channeled through IICA, which will present the ROCAP controller with monthly vouchers in the required format. IICA, OIRSA, and CATIE have all agreed to the following financial arrangements: all project funded scientists will be contracted and directly salaried by IICA, although several of these scientists will be administratively

assigned to OIRSA or CATIE. Commodities will be procured by CATIE and OIRSA, which will have reimbursement arrangements with IICA. As described above, under Implementation, expenditures will be projected annually in work plans consolidated by PROMECAFE/IICA. Standard provisions controlling deviation from budgeted expenditures will apply.

F. Project Evaluation:

1) General

This project will have two formal outside evaluations: a mid-project progress evaluation in August, 1983, and a final impact evaluation in August, 1985. Both of these evaluations will be conducted by a consultant team of two specialists (plant pathologists with experience in coffee). Financing for these evaluations are budgeted in the Financial Plan. These formal evaluations will be in addition to the various internal evaluation mechanisms designed into the project as part of the process of analyzing the results of methodological research and development. In addition to these evaluation activities, ROCAP expects to conduct periodic in-house reviews of project implementation.

2) ROCAP Reviews

The first formal ROCAP review is anticipated in November 1981, following completion of project preparation, and initiation of full scale operations. This review will examine the work to date to insure that the necessary groundwork has been laid and to provide any guidance needed for proper implementation. The ROCAP reviews will be supervised by the project manager (Regional Agricultural Development Officer) and will include participation of professional experts as appropriate. Continuing in-house reviews, beyond regular monitoring and IICA quarterly activity reports, will be scheduled as indicated by project experience.

3) IICA Technical Reviews

A key element in the evaluation of this project will be semi-annual meetings, beginning in November 1981, of the Regional Organizations directly involved in the activities of the project. The travel and per diem to bring the PROMECAFE and OIRSA directors and the CATIE representative to one location is provided for in the evaluation budget line item of the project budget. The Regional ADO or the Assistant Regional ADO will represent ROCAP in these meetings.

The purpose of these meetings will be to evaluate the implementation progress of the project, to resolve any differences among the regional institutions, modify project activities and to make recommendations to improve project implementation. The PROMECAFE director, with the assistance of the Project Administrator, will arrange the agendas for the meetings. Long-term technical experts and National Government/Coffee Institute representatives will be invited to attend, as appropriate. The PROMECAFE Director will be responsible for providing formal summaries of these meetings to all participating organizations, including ROCAP.

The semi-annual program review meetings will draw heavily from technical information and recommendations compiled by long-term project funded scientists involved in each activity. These formal written reports will evaluate the extent to which the project's short time frame, medium time frame, and long time frame objectives are being realized. For example, the reports on the short time frame activities: epidemiology of the rust, by the plant pathologist; control of broca, by the entomologist; and efficacy of copper-based fungicides, by the residue and registration specialist; are scheduled for June, 1983 in the Implementation Plan. The reports on the medium time frame and long time frame activities will be due from responsible project funded scientists in April, 1984 and December, 1984 respectively. These reports will be cumulative: objectives evaluated previously will be re-examined at each reporting date, and will provide the basis for any proposed modifications in project design or implementation schedules.

#### G. Conditions and Covenants

##### 1. Conditions

###### A) 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, signed working agreements with OIRSA and CATIE which include a detailed work plan for the first year of the project, and which delineate their respective responsibilities and contributions to the project.

B) 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, PROMECAFE/IICA shall furnish in form and substance satisfactory to AID:

1) An executed agreement with the participating national institution(s) which will govern the working relationships, define the contributions of the parties and provide that the participating national institutions will, with regard to its activities, be they research, credit, or extension services, give preferential treatment to the needs of small coffee farmers.

2. Covenants

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

A) To provide such additional goods and services as may be agreed upon between AID and IICA for a total of not less than the equivalent of \$1,576,000 during the period June 1, through May 31, 1986.

B) 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.

Project Design Summary  
Logical Framework

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions (Assumptions for achieving goal targets)
<p>(Program or Sector Goal: The broader objective to which this project contributes)</p> <p><u>Goal:</u> To increase income of small coffee producers in Central America.</p> <p><u>Purpose:</u> 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>(Measure of Goal Achievement)</p> <p>Conditions that will indicate that purpose has been achieved. End of project status.</p> <ol style="list-style-type: none"> <li>1. National institutions will be conducting production system and transfer research as developed in conjunction with regional institutions.</li> <li>2. Trained personnel in regional and national institutions will be performing increased experiments and field trials related to coffee pest problems.</li> <li>3. Modes and methodologies for application of research results to the small farmer situation will have been developed and tested.</li> <li>4. A system of insecticide standardization, residue level and registration will have been adopted region-wide.</li> <li>5. Improved rust resistant coffee seeds will be produced and disseminated through national institutions to small farmers.</li> </ol>	<p>Coffee Information Network and Data Base. General Economic Data for Central America. Project Evaluations</p> <p>Information systems PRONECAPE/IICA records Project Evaluations OIRSA records National Coffee Institute records.</p>	<ol style="list-style-type: none"> <li>1. If left unchecked coffee rust will become a major problem in Central America and will result in major losses in production, foreign exchange, and employment, and will have a devastating effect on small farmers by causing losses in income, and the abandonment of coffee as a primary income producing crop.</li> </ol> <p>(Assumptions for achieving purpose)</p> <ol style="list-style-type: none"> <li>1. C. A. governments will support expanded regional and national research efforts in rust and broca control and technification of coffee production, with emphasis on the small coffee farmer.</li> <li>2. Small farmers will accept seeds of improved varieties and farm practices required for increased coffee production.</li> </ol>

Project Design Summary  
Logical Framework

Narrative Summary	Objectively verifiable Indicators	Means of Verification	Important Assumptions
<p><u>Outputs:</u></p> <p>1. Information on the epidemiology of the rust and the effectiveness of selected fungicides.</p> <p>2. Development of the integrated control program broca, including evaluation of the effectiveness of biological and chemical controls.</p> <p>3. Development of residue and tolerance data for uniform registration of pesticides</p> <p>4. Development and reproduction of high-yielding varieties of coffee, suitable to the Central American environment.</p>	<p>1a. Information network/data base at IICA. Incorporates information on the spread of rust.</p> <p>1b. For residue analysis ICAITI receives samples which contain the residue of fungicides found to be effective in the field.</p> <p>2a. Information Network/Data base incorporates information developed on control of broca.</p> <p>2b. Development/Adaption of Appropriate technology activity includes methodologies to control broca.</p> <p>2c. For residue analysis, ICAITI receives samples which contain the residue of pesticides found to be effective in the field.</p> <p>3a. Information Network/Data Base includes information developed on pesticides.</p> <p>3b. Development/Adaption of Appropriate Technology activity includes methodologies for pesticide selection</p> <p>4a. Reports of tests at CIPC, Portugal indicates certain varieties are resistant to all known strains of coffee rust.</p> <p>4b. National research agencies cultivate and conduct tests on varieties found to be resistant at CIPC, Portugal.</p>	<p>Plant pathologist reports</p> <p>IICA data base activity</p> <p>PROMECAFE records</p> <p>OIRSA records</p> <p>ICAITI residue test reports.</p> <p>Entomologist's reports</p> <p>IICA Data Base</p> <p>PROMECAFE records</p> <p>OIRSA records</p> <p>ICAITI sample test reports</p> <p>OIRSA records</p> <p>PROMECAFE records</p> <p>Plant breeder/pathologist reports</p> <p>CAT records</p> <p>PROMECAFE Records</p> <p>Project Evaluations</p>	

Cont...

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
5. Development and adaption of appropriate technologies for the small coffee farmer.	5a. Technification methodologies are tested in Honduras in conjunction with the USAID/H project, *  5b. Information Network/Data Base incorporates appropriate methodologies.  5c. Production per technified manzana increased from 5-10 quintales to 20-25 quintales in field trials.	IICAFE records  USAID Honduras records  PROMECAFE records  Project Evaluations  Field Visits	
6. Training of Technicians from regional and national institutions.	6a. 12 national technicians trained in resistance evaluation at VICOSA and CIFIC.  6b. On-the-job training provided to at least 50 national technicians by regional specialists.  6c. Approximately 15 short courses (1-2 week duration) conducted by regional specialists.	Regional Specialists reports  PROMECAFE records  Project Evaluation	
7. Development of a comprehensive information network, including a computerized data base.	7a. PROMECAFE publications reflect information developed from all activities of the project.  7b. IICA Data Base includes information developed under outputs 1-5.	IICA/PROMECAFE records	

\*and in 1 or 2 other countries, as appropriate.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><u>Inputs:</u></p> <p><u>AID Contribution Grant \$3.5 million</u></p> <p>Technical Assistance 1,094</p> <p>Travel and Per Diem 223</p> <p>Training 366</p> <p>Contract Services: seed/sample testing 333</p> <p>Greenhouses, laboratories, equipment and supplies 753</p> <p>Seed and sample distribution 157</p> <p>Overhead 164</p> <p>Evaluation 60</p> <p>Contingency 350</p> <p><u>Regional and National Institutions \$3.7 million</u></p> <p>Personnel 2,718</p> <p>Travel and Per Diem, incl. local transportation 413</p> <p>Use of land and lab and other facilities 198</p> <p>Administrative Support 320</p>	<p>(Costs of inputs) <u>\$000</u></p>	<p>Review of ROCAP financial record.</p> <p>Records of various institutions</p>	<p>Funds are available in future years to be incrementally obligated</p> <p>Inputs as provided in agreements are available and provided on a timely bases.</p>

PROJECT AUTHORIZATION

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, 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 Three Million Five Hundred Thousand United States Dollars (\$3,500,000) in grant funds ("Grant") over a five-year period 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.

2. The project ("Project") consists of supporting a regional effort within Central America and Panama to (a) develop information on the epidemiology of rust and the effectiveness of selected fungicides, (b) develop residue and tolerance data for the uniform registration of pesticides, (c) develop and reproduce high-yielding rust resistant varieties of coffee, (d) develop and adapt appropriate technologies for the small coffee farmer and (e) develop a comprehensive coffee information network.

3. The Project Agreement, which may be negotiated and executed by the officer to whom such authority is delegated in accordance with AID regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as AID may deem appropriate.

a. Source and Origin of Goods and Services

Goods and services, except for ocean shipping, and except as provided in subsection 3.e. hereunder, financed by A.I.D. under the Grant shall have their source and origin in the United States or in countries that are members of the Central American Common Market, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Grant shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

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 Inter-nacional Regional de Sanidad Agropecuaria (OIRSA) and the Centro Agronomico Tropico de Investigacion y Ensenanza (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. Condition Precedent to Disbursement for Project Activities in Participating Countries

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement to finance Project activities in a 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.

d. Covenants

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

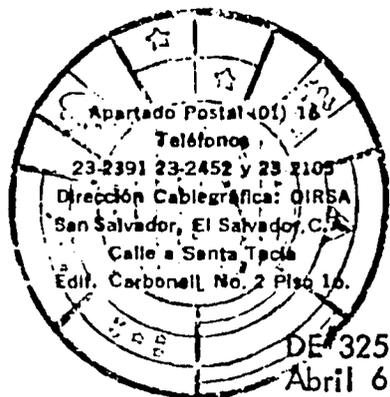
- (1) Provide such goods and services for the Project during the period May, 1981 through May, 1986 as may be agreed upon between the Grantee and A.I.D., in an amount not less than \$1,576,000 equivalent.
- (2) Furnish to A.I.D., in form and substance satisfactory to A.I.D., on an annual basis each year 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.

e. Waivers

- (1) Goods and services for training and testing for rust resistance, financed by A.I.D. under the Project Agreement in an amount not to exceed \$350,000 may have their source and origin in countries included in A.I.D. Geographic Code 941, except as A.I.D. may otherwise agree in writing.
- (2) Goods and services for training and testing for rust resistance, financed by A.I.D. under the Project Agreement in an amount not to exceed \$350,000 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.

*Edward Wilkins*  
 \_\_\_\_\_  
 Acting Assistant Administrator  
 Bureau for Latin America  
 and the Caribbean

*June 3 1981*  
 \_\_\_\_\_  
 Date



ORGANISMO INTERNACIONAL REGIONAL DE SANIDAD AGROPECUARIA  
 MEXICO-CENTRO AMERICA Y PANAMA  
**OIRSA**

DE 325 - A.2 SV-A.2  
 Abril 6, 1981

ACTION: RURAL DEV OF

USAID/ROCAP  
 GUATEMALA  
 APR 19 2 57 PM '81

Sr. Henry Bassford,  
 Director en funciones de ROCAP  
 8a. C. 7-86, Zona 9  
 GUATEMALA

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DATE	INITIALS:

Estimado Señor Bassford:

El Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA), tiene a bien dirigirse a usted para expresar su pleno acuerdo y respaldo al proyecto de apoyo regional para el control de plagas y enfermedades del café, que tiene especial énfasis en acelerar el proceso para conocer mejor la biología del hongo Hemileia vastatrix y su combate, producción de variedades resistentes, continuación y reforzamiento de los estudios para el control de la Broca del grano del cafeto (Hypothenemus hampei) y el establecimiento de análisis de residuos, control y registros de los pesticidas usados contra estas plagas y enfermedades de tanta importancia económica y cuarentenaria para los países miembros del OIRSA.

Este Organismo, consciente de su responsabilidad, está dispuesto a proveer los insumos necesarios que le corresponden en su participación en los programas de biología de la Roya, ensayos para el control de la Broca y la coordinación de la asistencia del proyecto sobre residuos.

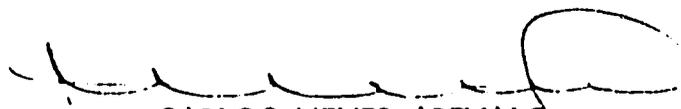
Por la importancia que representa el cultivo del café para la Región, no debemos dudar que este proyecto, acompañado de una tecnificación de los cafetales, producirá un incremento en la producción que permitirá la coexistencia de nuestros cafetales con las enfermedades y plagas que actualmente los afectan, así como con los precios oscilantes de este producto.

Aprovecho complacido esta ocasión para testimoniar el esfuerzo que ROCAP

DE#325 - A.2 SV-A.2  
Hoja # 2  
Abril 6, 1981

está realizando para beneficio de los países de Centroamérica y Panamá, esfuerzo que este Organismo sabe apreciar en su lucha para el bienestar de la agricultura de sus países miembros.

Le saluda con toda consideración,



CARLOS MEYER AREVALO  
Director Ejecutivo



INSTITUTO INTERAMERICANO DE COOPERACION PARA LA AGRICULTURA  
INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE  
INSTITUT INTERAMERICAIN DE COOPERATION POUR L'AGRICULTURE  
INSTITUTO INTERAMERICANO DE COOPERACAO PARA A AGRICULTURA

DIRECCION GENERAL

Sede Central  
Apartado Postal 55  
2200 Coronado  
San José, Costa Rica  
Cable: IICASANJOSE  
Telex: 2144 IICA

SC/DG-1557  
15 de abril de 1981

Sr. Henry Bassford  
Director de ROCAP  
c/o Embajada Americana  
Guatemala, Guatemala

ACTION: RURAL DEV

APR 21 8 52 AM '81  
MAIL ROOM  
USAID/GUATEMALA

Estimado señor Bassford:

Me dirijo a usted en relación al interés mutuo que tienen nuestras instituciones en los efectos que dos problemas tan serios como la roya y la broca podrían tener sobre la caficultura del área.

Es de sobra conocida la importancia de la actividad cafetalera en Centro América. Baste decir que un muy alto porcentaje de las fincas cafetaleras son pequeñas explotaciones. Que la caficultura genera cerca del 50 por ciento del valor total de las exportaciones fuera del área. Que proporciona trabajo a más del 35 por ciento de la mano de obra rural disponible. Que los ingresos fiscales generados en los impuestos al café suman varios cientos de millones de pesos centroamericanos y que la actividad cafetalera forma más del 10 por ciento del producto interno bruto del área.

Todo esto revela que una catástrofe como una nueva enfermedad o plaga que destruya esta actividad, tendría un efecto funesto sobre la estabilidad económica y social de estos países.

Es por eso que nuestro programa denominado PROMECAFE, hace esfuerzos por apoyar las actividades cafetaleras de investigación de los países, tendientes a fortalecer la caficultura a nivel nacional y procurar por este medio hacerla menos vulnerable a los problemas mencionados y otros que pudiesen venir.

## INSTITUTO INTERAMERICANO DE COOPERACION PARA LA AGRICULTURA

DESTINATARIO ..... Sr. Henry Bassford ..... HOJA No. ..... 2 ..... CODIGO ..... SC/DG-1557 .....

La tarea que debe hacerse es muy grande y debe hacerse de inmediato. Por esta razón el personal de PROMECAFE, junto con personal del CATIE y OIRSA y desde luego en íntima relación con personal de ROCAP, han estado trabajando en un proyecto que ampliaría y aceleraría las acciones de PROMECAFE, aprovechando la capacidad institucional instalada en el área.

Me permito ahora proponer a usted este proyecto que podría hacerse en tres o cuatro años con un costo tentativo total de US\$7.6 millones de los cuales US\$2.6 serían aportados por los países, US\$1.5 aportados por los organismos regionales en la siguiente forma: IICA-PROMECAFE US\$879 000, CATIE US\$202 000 y OIRSA US\$430 000. El aporte de AID-ROCAP sería de US\$3.5 millones.

El IICA-PROMECAFE se encargaría de hacer los acuerdos que sean necesarios tanto con los otros organismos regionales como con los países en los que se exprese el apoyo y el compromiso de cada uno para llevar adelante este proyecto.

Gran parte de la contribución de ROCAP comprendería asistencia técnica, capacitación de personal, equipo y materiales y contratación de servicios para probar variedades resistentes a roya y análisis de residuos de pesticidas en el grano. Los organismos regionales y nacionales participantes contribuirían con personal nacional y el apoyo logístico requerido para realizar las acciones.

Los miembros de PROMECAFE han conocido de estas gestiones en las dos últimas reuniones del Consejo Asesor y están totalmente de acuerdo. En la última reunión celebrada el mes pasado en Panamá acordaron agradecer a ROCAP su interés en este asunto, ofreciendo su apoyo al proyecto y se comprometieron a hacer gestiones ante los respectivos RDO's a nivel de país.

Los objetivos del proyecto son en buena parte relacionados con la investigación científica de algunos problemas inmediatos, por lo que se esperaría que produzca resultados concretos a corto y mediano plazo que podrían ser usados por los caficultores pequeños, principalmente.

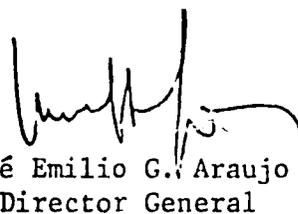
En un proyecto de esta naturaleza es casi imposible identificar y cuantificar los beneficiarios directos y mucho menos los indirectos. Los productos del proyecto serían entregados a los técnicos cafetaleros de los países, los que a su vez los pasarán a los caficultores. Pero sí se puede afirmar que cuanto mejores y más rápidas sean las soluciones encontradas así también serán los efectos sobre la economía y estabilidad social de Centro América.

INSTITUTO INTERAMERICANO DE COOPERACION PARA LA AGRICULTURA

DESTINATARIO Sr. Henry Bassford..... HOJA No. 3..... CODIC. ..SC/DG-1557.....

Los países por su parte están poniendo los medios para salvar sus caficulturas, pero no podrán hacerlo solos y aislados. Es por eso que confío en que AID estudiará este proyecto y resolverá afirmativamente sobre el mismo.

Muy sinceramente,

  
José Emilio G. Araujo  
Director General

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DATE	INITIALS



## Centro Agronómico Tropical de Investigación y Enseñanza

Turrialba - Costa Rica — Teléfonos: 56-01-22 - 56-01-69 — Telex: 8005 CATIE C.R.

D/658  
15 de abril de 1981

MAIL ROOM  
USAID/GUATEMALA

APR 21 8 47 AM '81

Dr. Henry H. Bassford  
Director en Funciones  
ROCAP  
C/o Embajada Americana  
Guatemala, GUATEMALA

ACTION: RURAL DEV OF

Estimado Dr. Bassford:

Permítame en primer lugar, manifestarle mi complacencia por la iniciativa y decisión de la AID de apoyar el Proyecto sobre la Roya del Cafeto, de tanta trascendencia para los caficultores de escasos recursos de la región.

Hemos leído con detenimiento el Proyecto sobre la Roya del Cafeto AID/IICA-PROMECAFE y reconocemos su vital importancia para los países del área centroamericana, enfrentada a serios problemas de producción y productividad, pero con la decisión inquebrantable de los gobiernos de conservar su industria cafetalera.

Sin lugar a dudas, este Proyecto será de singular utilidad a los productores de limitados recursos, para quienes el combate químico y las técnicas sofisticadas resultan difíciles y quizás de solución parcial. Por lo tanto, las variedades resistentes integradas en un sistema de producción y manejo moderno, son su principal defensa contra la Roya del Cafeto.

El CATIE apoya con entusiasmo y se adhiere estrechamente a los planteamientos del Proyecto, y está dispuesta a dar el apoyo que esté al alcance de sus posibilidades para que las metas y objetivos del mismo se cumplan a cabalidad en la fase de su implementación.

De nuevo reiteramos y ratificamos nuestra total disposición de cooperar y participar con PROMECAFE, en aquellas áreas del Proyecto que nos corresponda desarrollar.

*[Handwritten signature]*  
..12

Dr. H.H Bassford

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D/658

Sin otro particular, me es grato saludarle muy atenta y cordialmente,

Gilberto Páez  
Director

cc: R.E. McColaugh

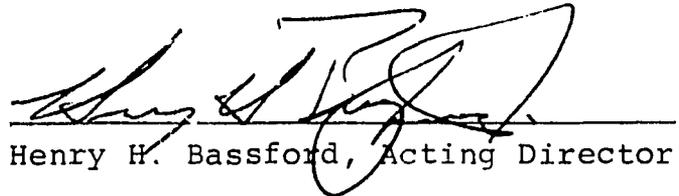
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ANNEX D

CERTIFICATION PURSUANT TO SECTION 611 (e) OF  
THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Henry H. Bassford, the Principal Officer of the Agency for International Development in the Regional Office for Central America and Panama, having taken into account, inter alia, the maintenance and utilization of projects in the Central America and Panama (CAP) Region previously financed or assisted by the United States, do hereby certify that, in my judgment, the executing agencies have both the financial capacity and human resources capability to effectively implement the proposed Coffee Pest Control Project Grant.

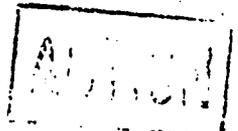
This judgment is based upon the project description and analysis as presented in the Coffee Pest Control Project Paper and is subject to the conditions imposed therein.

  
Henry H. Bassford, Acting Director

Date: APRIL 15, 1981

INCOMING  
DEPARTMENT OF STATE  
**TELEGRAM**  
AMERICAN EMBASSY GUATEMALA

ANNEX E



**UNCLASSIFIED**

00 RUEBGT  
DE RUEHC #6427 0122429  
ZNR JJUSU 22R  
O 100223Z JAN 61  
FM SECSTATE WASHDC  
TO RUEBGT/AMEMBASSY GUATEMALA IMMEDIATE 3074  
INFO RUESTE/AMEMBASSY TEGUCIGALPA IMMEDIATE 2230  
BT  
UNCLAS STATE 006427

**IMMEDIATE**

JAN 12 9 00 AM '61  
MAIL ROOM  
USAID/GUATEMALA

ACTION: ~~PROGRAM~~  
INFO: RURAL DEV  
ECONOMIC

AIDAC

E.O. 12065: N/A

TAGS:

SUBJECT: DAEC REVIEW OF REGIONAL COFFEE PEST CONTROL PID

101:	
AID	✓
ADM	
ECN	
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ONS	
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AID	
ROCAF	
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RSO	
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MRG	
CCAF	
FILE	

1. SUMMARY: THE DAEC REVIEWED AND APPROVED THE SUBJECT PID ON DECEMBER 19, 1960. SINCE ROCAF DOES NOT HAVE AUTHORITY TO APPROVE AND AUTHORIZE A PROJECT OF THIS SIZE AT THE MISSION LEVEL AND GIVEN THE FACT THAT THE SUBJECT PROJECT REPRESENTS AN INITIATIVE THAT COULD HAVE MAJOR BILATERAL FUNDING IMPLICATIONS IN THE REGION, IT WAS CONCLUDED THAT PROJECT SHOULD BE REVIEWED AND AUTHORIZED IN WASHINGTON. THE PRINCIPAL ISSUES DISCUSSED RELATED TO THE ECONOMIC FEASIBILITY AND BENEFIT INCIDENCE OF THE BROADER PROGRAM OF WHICH THIS PROJECT IS A PART AND TO THE RELATIONSHIP OF THE APPLIED RESEARCH TO NATIONAL PROGRAMS, PARTICULARLY THE PROPOSED HONDURAS PROJECT.

2. ECONOMIC ANALYSIS. FURTHER WORK WILL BE EXPECTED ON THE MACROECONOMIC ANALYSIS THAT WAS PRESENTED IN THE PID. ON THE COST SIDE THE MISSION SHOULD DETAIL THE BASIS FOR THE ESTIMATED INVESTMENT COST PER HAZANA TECHNIFIED. RECURRENT COSTS OF MUST CONTROL MEASURED WITH AND WITHOUT TECHNIFICATIONS SHOULD BE EXPLICITLY INCLUDED. ON THE BENEFIT SIDE, CONCERN WAS EXPRESSED THAT COMPLETE PREVENTION OF PRODUCTION

LOSSES IN THE REGION WAS INCLUDED AS A BENEFIT, WHEREAS ONLY 17 PERCENT OF COFFEE LANDS WOULD BE TECHNIFIED UNDER PRESENT PLANS. THIS DOES NOT ACCORD WITH OUR APPRECIATION OF THE DIFFICULTY OF LIMITING MUST LOSSES. GIVEN THE LONG PAY BACK PERIOD AND THE HIGH INITIAL INVESTMENT COSTS, THE SENSITIVITY OF THE REVISED E/C RATIO TO DISCOUNT RATES HIGHER THAN 10 PERCENT AND LEVELS OF EFFORT LOWER THAN THOSE PROJECTED, SHOULD BE EXAMINED. A FARM-LEVEL MICRO-ECONOMIC ANALYSIS WILL ALSO BE EXPECTED. THIS ANALYSIS SHOULD INDICATE THE CONDITIONS UNDER WHICH TECHNIFICATION AND THE HIGHER COSTS OF MUST CONTROL WOULD LIKELY BE ECONOMICALLY AND FINANCIALLY FEASIBLE FOR THE PROJECT'S TARGET GROUP.

3. BENEFIT INCIDENCE. QUESTIONS WERE RAISED AS TO THE LIKELY IMPACT THAT THIS PROJECT WOULD HAVE ON SMALL COFFEE GROWERS IN THE REGION. THE PROJECT ASSUMES NATIONAL EXTENSION PROGRAMS WILL SERVICE THE SMALL GROWERS, AND THAT THEY CAN BE MOTIVATED TO TECHNIFY. THESE ASSUMPTIONS WILL NEED TO BE CAREFULLY EXAMINED IN THE SOCIAL AND TECHNICAL

2487

# UNCLASSIFIED

## ANALYSES.

4. ADAPTIVE RESEARCH FOR TECHNIFICATION. THE HONDURAS AND ROCAP PIDS APPEAR TO OVERLAP WITH REGARD TO ADAPTING DELIVERY METHODOLOGIES AND TECHNOLOGY PACKAGES FOR THE SMALL FARMER. IT WAS AGREED THAT THIS PARTICULAR ACTIVITY IS OF CRITICAL IMPORTANCE, BUT IT WAS UNCLEAR AS TO WHETHER IT IS MORE APPROPRIATELY CARRIED OUT REGIONALLY OR NATIONALLY, OR WHAT THE APPROPRIATE DIVISION SHOULD BE. IT IS EXPECTED THAT ROCAP WILL EXPLORE THIS POINT IN MORE DETAIL WITH THE MISSIONS, PARTICULARLY HONDURAS. THE PP SHOULD INCLUDE A DISCUSSION OF HOW THE REGIONAL AND NATIONAL PROGRAMS RELATE TO ONE ANOTHER WITH REGARD TO ACTIVITIES TO BE DONE UNDER EACH AND DEGREE OF OVERLAP, IF ANY.

5. AVAILABILITY OF INPUTS. ASSUMING THAT THE NATIONAL GOVERNMENTS DO DEVOTE THE REQUIRED FINANCIAL RESOURCES TO AMBITIOUS TECHNIFICATION PROGRAMS, THE PP SHOULD EXAMINE WHETHER OR NOT THERE ARE CONSTRAINTS ON THE OTHER INPUTS REQUIRED, SUCH AS FERTILIZERS, PESTICIDES AND SEEDS. ALSO, THE SUPPLY OF AND DEMAND FOR LABOR DURING THE VARIOUS PHASES OF TECHNIFIED COFFEE PRODUCTION SHOULD BE ANALYZED.

6. RELATIONSHIP OF VERTICAL PEST CONTROL PROGRAMS. A VARIETY OF PEST CONTROL PROGRAMS ARE ALREADY UNDERWAY IN THE REGION. THE PP SHOULD DISCUSS THE RATIONALE FOR CREATING ANOTHER VERTICAL PROGRAM VS. A MORE, INTEGRATED PEST CONTROL PROGRAM FOR OTHER THAN JUST COFFEE AND HOW

THE VARIOUS VERTICAL PROGRAMS WILL RELATE OVER THE SHORT AND LONG TERM.

7. PROCUREMENT WAIVER. PP SHOULD INCLUDE JUSTIFICATION FOR 941 WAIVER TO PERMIT PROCUREMENT OF ESSENTIAL GOODS AND SERVICES FROM PORTUGAL AND BRAZIL.

8. FY 81 FUNDING. THE PID REQUESTS DOLS 400,000 IN FY 81 FUNDING, WHEREAS THE OYB AMOUNT IS DOLS 350,000. WE UNDERSTAND THE ADDITIONAL AMOUNT, IF REQUESTED IN THE PP, WOULD BE TAKEN FROM ELSEWHERE IN THE OYB.

9. PROJECT DEVELOPMENT. FOR SOCIAL, ECONOMIC AND TECHNICAL ANALYSES, IT IS RECOMMENDED THAT ROCAP AND HONDURAS MISSIONS COMBINE EFFORTS. IF NEEDED, TOY ASSISTANCE FROM AID/W SHOULD BE REQUESTED AFTER BOTH MISSIONS HAVE DETERMINED WHICH PORTIONS OF ANALYSES ARE TO BE DONE IN COMMON. MUSKIE

BT  
#6467

ACTION COPY	
THIS COPY MUST BE RETURNED TO CENTRAL FILE INDICATING THE ACTION TAKEN AND DATE.	
ACTION TAKEN	U.A.N.
DATE	7/6/81

## 5C(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable generally to projects with FAA funds and project criteria applicable to individual fund sources: Development Assistance (with a subcategory for criteria applicable only to loans); and Economic Support Fund.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE?  
HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PRODUCT?

A. GENERAL CRITERIA FOR PROJECT

1. FY 79 App. Act Unnumbered; FAA Sec. 653 (b); Sec. 634A. (a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure)?
  - a) Congressional Notification Process
  - b) Yes
2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?
  - a) Yes
  - b) Yes
3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?
 

N.A.
4. FAA Sec. 611(b); FY 79 App. Act Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per the Principles and Standards for Planning Water and Related Land Resources dated October 25, 1973?
 

N.A.
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?
 

Yes
6. FAA Sec. 209. Is project susceptible of execution as part of regional or multilateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.
 

Project is a regional effort.

## A.

7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

- a) Yes
- b) Yes
- c) Yes
- d) No impact
- e) Yes
- f) No

8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

U.S. commodities will be purchased from U.S. private enterprise.

9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.

Regional institutions will contribute 22 per cent and national agencies will contribute 29 per cent project costs.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?

No

11. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?

Yes

12. FY 79 App. Act Sec. 608. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar, or competing commodity?

Project is directed to help maintain presently produced commodity, not produced by U.S. producers.

B. FUNDING CRITERIA FOR PROJECT1. Development Assistance Project Criteria

a. FAA Sec. 102(b); 111; 113; 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained

- a) Project will involve small farmers and contribute to rural employment.
- b) Project is a regional effort but at the national level may and likely will help strengthen cooperatives.

## B.1.a.

basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

- c) Participating countries are support the effort
- d) No specific impact
- e) Project is a regional effort

b. FAA Sec. 103, 103A, 104, 105, 106, 107.  
Is assistance being made available: (include only applicable paragraph which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.)

(1) [103] for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers;

Project seeks to increase productivity of small farmers to maintain coffee production which is principal source of rural employment.

(2) [104] for population planning under sec. 104(b) or health under sec. 104(c); if so, extent to which activity emphasizes low-cost, integrated delivery systems for health, nutrition and family planning for the poorest people, with particular attention to the needs of mothers and young children, using paramedical and auxiliary medical personnel, clinics and health posts, commercial distribution systems and other modes of community research.

N.A.

(3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;

N.A.

(4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:

N.A.

(i) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;

(ii) to help alleviate energy problems;

(iii) research into, and evaluation of, economic development processes and techniques;

(iv) reconstruction after natural or manmade disaster;

## B.1.b.(4).

(v) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;

(vi) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

c. [107] Is appropriate effort placed on use of appropriate technology?

Yes

d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?

National and regional institutions will provide 51 per cent of project costs.

e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to the Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"?

Yes  
(Regional project)

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental and political processes essential to self-government.

Project designed to assist small producers within region National level technicians will contribute a major role. Training of national level personnel a major activity.

g. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase or productive capacities and self-sustaining economic growth?

Yes

2. Development Assistance Project Criteria  
(Loans Only)

a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects.

N.A.

b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life

N.A.

B.

3. Project Criteria Solely for Economic Support Fund

a. FAA Sec. 531(a). Will this assistance support promote economic or political stability? To the extent possible, does it reflect the policy directions of section 102?

N.A.

b. FAA Sec. 533. Will assistance under this chapter be used for military, or paramilitary activities?

N.A.

TABLE 1

FINANCIAL RESOURCES FOR COFFEE TECHNIFICATION  
AND RUST CONTROL  
(In Thousands of Dollars)

	(1)	(2)	(3)
	<u>To Public Sector</u>	<u>Bank Credit for Private Sector</u>	<u>Total (1) + (2)</u>
Guatemala	2,000	40,000 <sup>E</sup>	42,000
Honduras	13,000	12,000	25,000
El Salvador	1,240	6,800	8,040
Nicaragua	22,000	-	22,000
Costa Rica	140	(14,000)	140
Panama	<u>-</u>	<u>1,100</u>	<u>1,100</u>
Total	38,380	59,900*	98,280*

E - Crude Estimate

\* - Excludes Costa Rica

Source: Data collected by Coffee Rust Team; and technification proposals of Guatemala, Honduras and Costa Rica.

TABLE 2APPLICATION FOR LOANS FILED WITH THE IFIS  
(In Millions of U.S. Dollars)

	<u>IDB</u>	<u>CABEI</u>	<u>AID</u>	<u>IBRD</u>	<u>TOTAL</u>
Guatemala	-	-	-	-	-
El Salvador	4.0	10.0	-	-	14.0
Honduras	10.0	-	9.5	-	19.5
Nicaragua	20.0	4.8	-	-	24.8
Costa Rica	-	1.4	-	-	1.4
Panama	-	-	-	2.3	2.3
	<u>          </u>				
Total	34.0	16.2	9.5	2.3	62.0

TABLE 1A

COSTA RICA: ESTIMATED COST OF PRODUCTION PER MANZANA

(In U.S. dollars)

	On Non-Technified with Yields of 7-10 Quintales "Dry Bean" <sup>1/</sup> per Mz.		On Farm with Yields of 30-35 Quintales "Dry Bean" <sup>1/</sup> Per Mz. (Technified)
	Without Spraying (Before Rust)	With Spraying (After Rust)	(With Spraying, Fertilizer, etc.)
<u>Labor</u>			
Pruning of Trees & Removal of Side Shoots			29.3
Shading			20.5
Application of Nutrients, Insec- ticides & Fungicides	-	20.0	29.0
Application of Fertilizer	-	-	17.5
Application of Herbicides	-	-	14.6
Replanting (5% p.a.)	2.0	2.0	6.0
Weeding (by hand)	41.0	41.0	9.0
<u>Materials</u>			
Seedlings	11.0	11.0	33.0
Fungicides	-	40.0	40.0
Fertilizer	-	-	194.0
Nutrients	-	-	11.2
Herbicides	-	-	27.2
Other Materials	-	41.3 <sup>2/</sup>	48.0
<u>Other Costs</u>			
Harvesting & Trans- port of Crop	244.7	195.8	652.5
Fringe Benefits & TA	-	-	39.2
<b>TOTAL</b>	<b>298.7</b>	<b>351.1</b>	<b>1,171.0</b>

<sup>1/</sup>"Pergamino" in Spanish.<sup>2/</sup>Equipment and fuel (\$124 over three years or \$41.3 p.a.)

Source: Based on estimates in report by Oficina de Planificación Sectorial Agropecuaria (OPSA), Programa de Mejoramiento de la Producción de Café en Costa Rica, Tables Annex B and 7C; and on judgments of coffee experts.

TABLE 1A

VALUE OF PRODUCTION AND PROFIT  
(In U.S. dollars)

	On Small Farm with Yields of 7-10 Quintales "Dry Bean" <sup>1/</sup> per Mz. (Non-Technified)		On Farm with Yields of 30-35 Quintales "Dry Bean" <sup>1/</sup> Per Mz. (Technified)
	<u>Without Spraying (Before Rust)</u>	<u>With Spraying (After Rust)</u>	
1. Value of 8.0 Quintales at \$70 per quintal	\$560	-	-
2. Value of 6.4 <sup>2/</sup> Quintales at \$70 per quintal	-	448	-
3. Value of 29.2 <sup>3/</sup> Quintales at \$70 per quintal	-	-	2,044
4. Costs <sup>4/</sup>	<u>299</u>	<u>351</u>	<u>1,171</u>
5. Annual Profit (Value of output less costs)	261	97	873
6. Internal rate of return on investment for technification: 23.2% <sup>5/</sup>			

<sup>1/</sup>"Pergamino."

<sup>2/</sup>Assumes a 20% loss due to coffee rust in spite of spraying.

<sup>3/</sup>Assumes a 10% loss due to coffee rust in spite of technification (32.5 quintales x .9 = 29.2 quintales).

<sup>4/</sup>From Page 1 of this Annex.

TABLE 1A

5/Calculated as follows:

<u>Investment outlays:</u>		<u>Investment Discount at 10% p.a.</u>
Year 1	\$2,137	2,137
Year 2	752	684
Year 3	1,069	883
	<u>3,958*</u>	<u>3,704</u>

\*Assume N=20, annual cash flow = \$873, and PV = \$3,704,  
IRR = 23.2.

TABLE 1B

GUATEMALA: ESTIMATED COST OF PRODUCTION PER MANZANA  
(In U.S. dollars)

	On Non-Technified Farm (7-10 Quintales of Dry Coffee Bean per Mz.)			On Technified Farm (30-35 Quintales Dry Bean per Mz.)
	Without Spraying <sup>1/</sup> (Before Rust)	With Spraying (Shadow Wage) (After Rust) <sup>2/</sup>	With Spraying (New Minimum Wage & Fringe Benefits) (After Rust) <sup>3/</sup>	(Full Cost, After Rust) <sup>4/</sup>
<u>Cultivation</u>				
Weeding (by hand)	48.0	48.0	76.8	76.8
Digging holes for replanting	9.5	9.5	12.0	12.0
Seedlings	-	-	-	6.4
Planting	6.0	6.0	9.0	9.0
Shading	-	-	-	12.8
Pruning & Removal of Side Shoots	-	-	-	38.4
<u>Inputs (Materials)</u>				
Nursing Plants	-	-	-	40.0
Fertilizer	-	-	-	288.0
Application of Fertilizer	-	-	-	19.2
Pesticides & Application	-	-	-	64.0
Fungicides & Application	-	80.0	100.0	100.0
<u>Equipment</u>	18.3	38.3	38.3	50.0
<u>Credit Costs</u>	-	-	-	160.0
<u>Harvesting</u>				
(\$10 to \$12/Quintal)	81.0	64.8	102.4	384.0
<u>Drying &amp; Transport</u>	28.0	22.4	35.2	165.0
<u>Labor Benefits</u>	-	-	24.0	107.4
<u>Taxes</u>	27.7	21.2	21.2	107.5
TOTAL	218.5	290.2	418.9	1,640.5

<sup>1/</sup>Assumes farmer and family do all the work themselves and pay themselves the shadow wage (62% of the minimum wage) -- and no rent for the land. Calculation shows situation before appearance of rust, hence makes no allowance for fumigation.

<sup>2/</sup>Same assumption as in Column (1) except that allowance is made for cost of fumigation against rust.

<sup>3/</sup>Assumes payment of full minimum wage (possibly to himself) of \$3.20 a day.

<sup>4/</sup>Total annual cost of production per manzana following completion of technification program.  
Assumes farmer pays (possibly to himself) full amount of new minimum wage of \$3.20/day.

TABLE 1B

GUATEMALA: VALUE OF PRODUCTION AND PROFIT PER MANZANA  
(In U.S. dollars)

	<u>Non-Technified Farm</u>			<u>Technified Farm</u>
	<u>Without Spraying (Before Rust)</u>	<u>With Spraying (Shadow Wage) (After Rust)</u>	<u>With Spraying &amp; New Minimum Wage (After Rust)</u>	<u>(With Spraying, Fertilizer, etc. &amp; Payment of Minimum Wage) (After Rust)</u>
<u>Value of Production</u>				
8.0 quintales at \$70 per quintal ("dry bean")*	\$560	-	-	-
6.4 quintales <sup>1/</sup> at \$70 per quintal ("dry bean")	-	\$448	-	-
6.4 quintales <sup>1/</sup> at \$70 per quintal ("dry bean")	-	-	\$448	-
30 quintales <sup>2/</sup> at \$70 per quintal ("dry bean")	-	-	-	\$2,100
Costs per Mz.	219	290	419	1,640
Profits per Mz.	341	158	29	460

Internal Rate of Return to Small Farmer on Investment in Technification: 10.8%<sup>3/</sup>

<sup>1/</sup>Assumes loss of 20% of output owing to coffee rust in spite of spraying.

<sup>2/</sup>Output with technification; makes allowance for a 10% loss due to coffee rust.

<sup>3/</sup>This is the rate of return after allowance for payment of legal minimum wage for all labor, including labor performed by the farmer for himself. The methodology followed is the same as in Table 1A.

\*"Dry bean" or "pergamino."

TABLE 1C

HONDURAS: OPERATING COSTS PER MANZANA (1979 DATA)

(In 1979 U.S. dollars)

	Traditional Non-Technified Farms		Technified Farms
	Without Spraying (Before Rust)	With Spraying (After Rust)	
<u>Control of Plagues &amp; Disease</u>		<u>80</u>	<u>157</u>
Labor	-	30	50
Materials	-	-	
Fungicides	-	50	86
Insecticides	-	-	11
Other Chemicals	-	-	10
<u>Fertilization</u>	-	-	<u>257</u>
Labor	-	-	69
Materials	-	-	188
<u>Weed Control, Manual</u>	50	50	
<u>Weed Control, Chemical</u>	-	-	<u>61</u>
Labor	-	-	12
Herbicides	-	-	19
Tools	-	-	30
<u>Shading, Pruning &amp; Replanting</u>	2	2	46
<u>Fuel</u>	-	5	10
<u>Equipment</u>	18	38	50
<u>Harvesting, Processing &amp; Transport of crop</u>	<u>210<sup>1/</sup></u>	<u>178<sup>2/</sup></u>	<u>525<sup>3/</sup></u>
TOTAL	280	353	1,106

TABLE 1C

HONDURAS: VALUE OF PRODUCTION AND PROFIT PER MANZANA  
(In U.S. dollars)

	<u>Non-technified Farms</u>		<u>Technified Farms</u>
	<u>Without Spraying</u> (Before Rust)	<u>With Spraying</u> (After Rust)	
<u>Value of Production</u>			
7.0 quintales at \$70 per quintal ("dry bean" or "pergamino")	\$490		
5.6 quintales at \$70 per quintal <sup>4/</sup> ("dry bean")		\$392	
30 quintales at \$70 per quintal <sup>5/</sup> ("dry bean")			\$2,100
Costs per Manzana	<u>280</u>	<u>353</u>	<u>1,106</u>
Profit per Manzana	210	39	994
Internal Rate of Return: 36.2%			

<sup>1/</sup>40% of cost of technified farm.  
<sup>2/</sup>15% below column (1) owing to losses due to rust.  
<sup>3/</sup>Source: IHCAFE, Estimación del Impacto de la Roya del Cafeto en Honduras, Feb. 80, Table 6, adjusted for yield of 30 quintales/Mz.  
<sup>4/</sup>Assumes 20% loss due to coffee rust.  
<sup>5/</sup>Assumes 10% loss due to coffee rust in spite of technification.  
<sup>6/</sup>Assumes N = 20, present value of investment of \$2,739 (see below), annual cash flow of 994. Present value of investment in technification is estimated as follows (in 1979 U.S. dollars)

		<u>Present Value Discounted at 10% a Year</u>
1st year	\$1,625	1,625
2nd year	475	432
3rd year	825	682
	<u>\$2,925</u>	<u>2,739</u>

Source: Calculations are based on 1979 data from the Instituto Hondureño del Cafe (IHCAFE), Estimación del Impacto Económico de la Roya del Cafeto en Honduras, Feb. 1980, Table #6.

TABLE 2

VALUE OF ADDITIONAL PRODUCTION RESULTING  
FROM TECHNIFICATION OF 180,000 MZ.

(In thousands of constant 1979 dollars)

	(1) <u>Number of Mz.</u> <u>Technified</u>	(2) <u>18,000 Mz.</u>	(3) <u>27,000 Mz.</u>	(4) <u>36,000 Mz.</u>	(5) <u>45,000 Mz.</u>	(6) <u>54,000 Mz.</u>	(7) <u>Total</u> <u>180,000 Mz.</u>
1981	18,000 Mz.	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
1982	27,000 Mz.	-	-	-	-	-	-
1983	36,000 Mz.	12,600	-	-	-	-	12,600
1984	45,000 Mz.	25,200	18,900	-	-	-	44,100
1985	54,000 Mz.	63,000	37,800	25,200	-	-	126,000
1986	-	"	94,500	50,400	31,500	-	239,400
1987	-	"	"	126,000	63,000	37,800	384,300
1988	-	"	"	"	157,500	75,600	516,600
1989	-	"	"	"	"	189,000	630,000
1990	-	"	"	"	"	"	"
1991	-	"	"	"	"	"	"
1992	-	"	"	"	"	"	"
1993	-	"	"	"	"	"	"
1994	-	"	"	"	"	"	"
1995	-	"	"	"	"	"	"

Note: For explanation of calculation, see following page.

The methodology used in calculating Table 2 is as follows:

Yield Assumptions

	Quintales per Mz.
1st year (year of planting new trees)	0
2nd year	0
3rd year	5
4th year	10
5th and following	25

Follow Column (2) of Table 2 downward: the first 18,000 manzanas are planted in 1981. There is no increase in production until 1983 when these 18,000 manzanas will produce an additional five quintales per manzana or a total of 90,000 quintales (5 x 18,000). This amount multiplied by the assumed price of \$140 per quintal (green coffee) or "oro" yields \$12.6 million. In 1984, these same 18,000 manzanas would yield an additional 10 quintales per manzana for a total production value of \$25.2 million (18,000 x 10 quintales x \$140 = \$25.2 million). In the third year, the additional yield will be up to 25 quintales per manzana, and the calculation becomes: 18,000 Mz. x 25 Mz. x \$140 = \$63.0 million. The additional output of the 18,000 manzanas is then assumed to remain constant through the balance of the projection period. The same procedure is then repeated for the 27,000 manzanas planted in 1982 (Column 3), the 36,000 manzanas planted in 1983 (Column 4), etc. The total value of production and exports, resulting from the technification of all 180,000 manzanas in each year appears in Column 7 of Table 2.

TABLE 3

TOTAL COST OF TECHNIFYING AND OPERATING ONE MANZANA  
IN COSTA RICA, SPREAD OVER A THREE-YEAR PERIOD  
(In 1979 dollars)

	<u>Investment Costs</u>	<u>Production (Operating) Costs</u>
<u>Labor</u>	<u>536.8</u>	<u>272.4</u>
Pruning and Removing Shoots	-	43.9
Uprooting Old Trees	171.3	-
Shading	21.9	62.9
Emplacement of Supporting Sticks	35.1	-
Digging Holes (for trees)	67.3	-
Planting and Replanting	46.8	5.9
Application of Calcium	11.7	-
Application of Nutrients, Insecticides and Fungicides	45.3	42.5
Application of Herbicides	32.1	23.4
Application of Fertilizer	24.8	27.8
Staking of Seedlings	43.9	-
Soil Conservation Practices	30.7	39.6
Weed Control	-	26.4
Distribution of Seedlings	5.9	-
<u>Materials</u>	<u>1,481.4</u>	<u>381.1</u>
Seedlings	279.2	35.9
Fertilizers (all types)	280.6	282.3
Fungicides	29.7	13.1
Herbicides	71.4	41.7
Calcium Carbonate	75.4	-
Stakes	45.7	-
Other	19.4	8.1
<u>Harvesting and Transport of Crop</u>	<u>-</u>	<u>1,019.5</u>

	<u>Investment Costs</u>	<u>Production (Operating) Costs</u>
<u>Other (Fringe Benefits, Technical Assistance)</u>	<u>195.3</u>	<u>82.3</u>
GRAND TOTAL	<u>2,213.5</u>	<u>1,755.3</u>
	<u>3,968.8</u>	

Source: Oficina de Planificación Sectorial Agropecuaria, Programa de  
Mejoramiento de la Producción de Café en Costa Rica, June  
1979, Pages 60-62.

TABLE 4

PROJECTED INCREASE IN REGIONAL PUBLIC SECTOR OUTLAYS<sup>1/</sup>  
(In constant 1979 dollars)

	<u>Annual Costs</u>
1. Additional extension workers: 1 per 500 Mz. i.e. 360 workers. <sup>2/</sup> Assumed salary \$600 per month of \$7,200 p.a.	\$ 2,592,000
2. Equipment, vehicles, fuel and material for extension workers, \$5,000 per worker	1,800,000
3. Training of extension workers, \$500 per technician for first year, \$200 p.a. thereafter (average annual cost over 5 years)	93,600
4. Research technicians 10 for each of the 6 C.A. country. At least one person on each team must be senior	
Senior research staff: 6 men x \$30,000	180,000
Other research staff: 54 men x \$15,000	810,000
5. Equipment and materials for research \$5,000 per worker (60)	300,000
6. Miscellaneous (buildings, utilities, administrative, etc.)	700,000
7. Information campaign	1,000,000
8. Additional research budget of regional institutions	1,020,000
Total, per annum	<u>8,495,600</u>
Cost over a five-year period	\$42,478,000
Cost per additional manzana to be "technified":	
<u>\$42,478,000</u>	
180,000	\$236

<sup>1/</sup>Excludes the amount of credit that the public sector must channel to the private sector to enable it to cover the investment costs of the "technification" program.

<sup>2/</sup>Possible distribution: Guatemala and Honduras 40 to 50 each; El Salvador 25; Nicaragua and Costa Rica 30 each; Panama 5.

TABLE 5

PROJECTION OF COSTS OF TECHNIFYING AND OPERATING  
180,000 MZ. (USING C.R. DATA)

(In thousands of constant 1979 dollars)

	(1) Number of Mz. Planted	(2) 18,000	(3) 27,000	(4) 36,000	(5) 45,000	(6) 54,000	(7) Total
1981	18,000	40,824	-	-	-	-	40,824
1982	27,000	14,364	61,236	-	-	-	75,600
1983	36,000	20,412	21,546	81,648	-	-	123,606
1984	45,000	22,680	30,618	28,728	102,060	-	184,086
1985	54,000	"	34,020	40,824	35,910	122,472	255,906
1986		"	"	45,360	51,030	43,092	196,182
1987		"	"	"	56,700	61,236	219,996
1988		"	"	"	"	68,040	226,800
1989		"	"	"	"	"	"
1990		"	"	"	"	"	"
1991		"	"	"	"	"	"
1992		"	"	"	"	"	"
1993		"	"	"	"	"	"
1994		"	"	"	"	"	"
1995		"	"	"	"	"	"

Note: For explanation of methodology used, see following page.

The major assumptions underlying the cost projections in Table 5 are as follows:

1. The average cost of technifying a manzana, including costs of fertilizing, spraying against coffee rust and other infestations, caring for the coffee trees and harvesting, is estimated at \$3,958 per manzana (Costa Rica data for 1979) over a three-year period, as calculated above. To this, we must add the additional budgetary allocations to the public sector to enable it to provide the improved services required (estimated in Table 4), bringing the total cost of technification to approximately \$4,200 per manzana.

2. The cost of technification and operating costs is distributed as follows over the three-year period: first year 54%; second year 19%; third year 27%. This distribution follows the one suggested by the Oficina de Planificación Sectorial Agropecuaria (OPSA) in an in-depth study published in June of 1979.<sup>1/</sup> Thus technification costs per manzana are projected as follows:

1st year	\$2,268
2nd year	798
3rd year	<u>1,134</u>
	\$4,200

3. Following technification, annual operating costs will be \$1,171 per manzana as shown in Table 1A. However, to this must be added the cost of processing "dry bean" into "green" coffee, which is estimated at \$3.00 per quintal or \$90.0 for the annual output of a technified manzana. This brings the annual operating costs of a technified farm to about \$1,260 per manzana.

The explanation of the costs projections in Table 5 is as follows:

Follow Column (2) downward: in 1981, it is assumed that 18,000 manzanas would be planted. Assuming a total technification cost of \$4,200 per manzana and that 54% of the cost would be incurred on the first year, 19% in the second and 27% in the third, costs for 1981-83 are as follows:

1/DOC-OPSA No. 33, Programa de Mejoramiento de la Producción de Café en Costa Rica, June 1979, Table 2, Page 19.

In 1981: 18,000 Mz. x \$2,268 (1st year's cost) = 40.8 million.

In 1982: 18,000 Mz. x \$798 (2nd year's cost) = 14.4 million.

In 1983: 18,000 Mz. x \$1,134 (3rd year's cost) = 20.4 million.

In 1984: 18,000 Mz. x \$1,260 = \$22.7 million. Note: annual operating costs in the fifth year and thereafter exceed third year technification costs because of the high cost of harvesting and transporting the much larger crop (see Table 1A).

In Column (3), we follow what would happen to the cost of planting 27,000 manzanas in the second year, using the same annual cost distribution. The total cost of the program in each year appears in Column (7).

TABLE 6

BENEFIT/COST CALCULATION FOR TECHNIFICATION,  
BASED ON COSTA RICA DATA

(In millions of constant 1979 dollars)

	<u>Total<sup>1/</sup></u> <u>Costs</u> <u>(1)</u>	<u>Costs</u> <u>Discounted</u> <u>at 10%<sup>3/</sup></u> <u>p.a.</u> <u>(2)</u>	<u>Increased</u> <u>Production</u> <u>Through</u> <u>Technification<sup>2/</sup></u> <u>(3)</u>	<u>Benefits</u> <u>Discounted</u> <u>at 10%<sup>3/</sup></u> <u>p.a.</u> <u>(4)</u>
1981	40.8	37.1	-	-
82	75.6	62.5	-	-
83	123.6	92.9	12.6	9.5
84	184.1	125.7	44.1	30.1
85	255.9	158.9	126.0	78.2
86	196.2	110.7	239.4	135.1
87	220.0	112.9	384.3	197.2
88	226.8	105.8	516.6	241.0
89	"	} 720.9	630.0	267.2
90	"		"	} 1,735.4
91	"		"	
92	"		"	
93	"		"	
94	"		"	
95	"		"	
96	"		"	
97	"		"	
98	"		"	
99	"	"	"	
2000	"	"	"	"
		<u>1,527.4</u>		<u>2,693.7</u>

Benefit/Cost Ratio: 1.76

<sup>1/</sup>Carried over from Table 5.

<sup>2/</sup>Carried over from Table 2.

<sup>3/</sup>10% discount rate is in real terms, i.e. over and above inflation rate.

TABLE 7

SENSITIVITY ANALYSIS

Assume a doubling of all costs of materials and fuel in relation to the price of coffee over the projection provided. The price of materials (per Mz.) in Table 1A were as follows:

Fungicides	\$ 40
Fertilizer	194
Nutrients	11
Herbicides	27
Other Materials	48
	<hr/>
	\$320
Transport Costs (\$5 per quintal on 30 quintales)	150

Assuming a 100% increase in the cost of materials and a 50% transport increase in costs,\* the increase in annual operating costs would be \$395 per Mz.; and total costs would increase by  $\frac{\$ 395}{1,260}$  or 31.3%.

The B/C ratio in Table 6 would then become:

$$\frac{\$2,694}{2,005} = 1.34^{**}$$

\*In relation to the price of coffee.  
 \*\*This calculation is based on the simplifying assumption that total costs (over the 20-year period of the B/C calculation) will rise in the same proportion as annual operating costs - i.e. by 31.3%.

ANNEX I

INITIAL ENVIRONMENTAL EXAMINATION

Project Title : Regional Coffee Pest Control  
Project Location: Central America  
Project Number : 596- 0090  
Funding : \$3,500,000  
Life of Project : FY 81-86  
IEE Prepared by : Eduardo Trujillo/Kevin Kelly  
Date: November 18, 1980

Recommended Threshold Decision: Negative Determination

Mission Director's Concurrence:

  
Henry H. Bassford, Acting Director

11/19/80  
Date

## ANNEX I

INITIAL ENVIRONMENTAL EXAMINATIONI. Project Description

In the past four years, coffee pests (particularly rust) new to the region have been found in Central America. These pests pose a severe threat to the region because coffee is a major export commodity and, if left unchecked, they could cause production to fall significantly. Some research on the problem is currently underway in various regional and national institutions, but it has been limited by a lack of sufficient resources. In addition, certain technologies (such as higher plant densities, different use of shade, fertilizer and water, and spraying) already have been developed which can help to reduce the impact of rust and other diseases. However, more research is needed if the problem is to be kept under control in Central America.

The project, therefore, 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 of technologies which will be of particular benefit to the small farmer. Research will be primary project activity and will focus on: (1) development of resistant varieties of coffee plants; (2) biological properties of rust; (3) reproduction of resistant varieties of coffee plants; (4) properties of broca and methods of control; (5) use and control/registration of pesticides and analysis of residue; and (6) development/adaptation of appropriate technologies for small farmer production of coffee. Additional activities include training of technicians from both regional and national level institutions, and the expansion of a data bank containing information relevant to coffee production. The major output of the project will be the results of each of the research activities and their adaptation and acceptance throughout Central America.

II. Project Area

The project will be implemented by the regional research institutions concerned with the control of coffee

## ANNEX I

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 approximately 205,000 small coffee producers.

In Central America, coffee is produced in regions ranging from 600 meters to 1,600 meters in altitude, but most commonly about 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, primarily coniferous and liquidambar, and in regions where deforestation and resultant erosion is frequent in the absence of coffee.

### III. Environmental Aspects

#### A. Direct Environmental Impacts

The project consists of research activities which will lead to improved control of coffee pests, particularly rust. Research will be 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. In addition, this activity will develop a system for registration of pesticides and chemical agents in order to have more effective control of their use. The use or application of pesticides under 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.

## ANNEX I

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 control, it is expected that the project will have a positive environmental impact on the long run. As part of the project, existing 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, when implemented by small farmers, which will have 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.

IV. Conclusions and Recommendations

From the above discussion, it is determined that the project will not have a significant direct effect on the environment. 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.

A negative determination is therefore recommended for this project.

V. Discussion of Impact

A. The project is designed to strengthen institutional research, to develop resistant varieties, and to establish the mechanisms for standardization of pesticides 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 pesticide for the control of coffee rust and other pests.

## ANNEX I

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 and pesticides used at those altitudes will find their way into hydrology systems. They will contaminate run off water. 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 leach readily may have a greater negative impact. Therefore, the project objective of uniform pesticide registration and standardization of regulations will have a moderate beneficial impact on water quality.

C. Achievement of project objectives will have a moderate impact on health. Specifically, it will contribute to a reduction in pesticide contamination of foods. At present, a large number of the food products consumed in the region are contaminated with pesticides because of indiscriminate sales and use. Such combination 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 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. 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.

## II. IMPACT IDENTIFICATION AND EVALUATION FORM

Impact  
Identification and  
Evaluation 1/

### Impact Areas and Sub-Areas

#### A. LAND USE

##### 1. Changing the character of the land through:

- |                                       |   |
|---------------------------------------|---|
| a. Increasing the population _____    | N |
| b. Extracting natural resources _____ | N |
| c. Land clearing _____                | N |
| d. Changing soil character _____      | N |

2. Altering natural defenses \_\_\_\_\_ N

3. Foreclosing important uses \_\_\_\_\_ N

4. Jeopardizing man or his works \_\_\_\_\_ N

##### 5. Other factors

Reduce pesticide pollution and contamination M+

of food.

#### B. WATER QUALITY

1. Physical state of water \_\_\_\_\_ N

2. Chemical and biological states \_\_\_\_\_ M+

3. Ecological balance \_\_\_\_\_ N

##### 4. Other factors

\_\_\_\_\_ N

\_\_\_\_\_

1/ We use the following symbols:

N = No environmental impact

L = Little environmental impact

M = Moderate environmental impact

H = High environmental impact

U = Unknown environmental impact

+ = Beneficial impact

- = Negative impact

## IMPACT IDENTIFICATION AND EVALUATION FORM

## C. ATMOSPHERIC

- |                          |   |
|--------------------------|---|
| 1. Air additives _____   | N |
| 2. Air pollution _____   | N |
| 3. Noise pollution _____ | N |
| 4. Other factors _____   |   |
| _____                    | N |
| _____                    |   |

## D. NATURAL RESOURCES

- |  |   |
|--|---|
| 1. Diversion, altered use of water _____       | N |
| 2. Irreversible, inefficient commitments _____ | N |
| 3. Other factors _____                         |   |
| _____  | N |
| _____  |   |

## E. CULTURAL

- |  |   |
|--|---|
| 1. Altering physical symbols _____       | N |
| 2. Dilution of cultural traditions _____ | N |
| 3. Other factors _____                   |   |
| _____                                    | N |
| _____                                    |   |

## F. SOCIOECONOMIC

- |   |   |
|---|---|
| 1. Change in economic/employment patterns _____ | N |
| 2. Changes in population _____                  | N |
| 3. Changes in cultural patterns _____           | N |
| 4. Other factors _____                          |   |
| _____   | N |

## IMPACT IDENTIFICATION AND EVALUATION FORM

## G. HEALTH

- |  |    |
|--|----|
| 1. Changing a natural environment _____      | N  |
| 2. Eliminating an ecosystem element _____    | N  |
| 3. Other factors                             |    |
| <u>Provide more balanced nutrition</u> _____ | M+ |
| _____  |    |

## H. GENERAL

- |                                 |   |
|---------------------------------|---|
| 1. International impacts _____  | N |
| 2. Controversial impacts _____  | N |
| 3. Larger program impacts _____ | N |
| 4. Other factors                |   |
| _____                           | N |
| _____                           |   |

## I. OTHER POSSIBLE IMPACTS (not listed above)

- |  |    |
|--|----|
| 1. Introduction of new plant species _____ | N  |
| 2. Agricultural chemicals _____            | M+ |
| 3. Other factors                           |    |
| _____                                      | N  |
| _____                                      |    |



Excerpted from  
Second Report of PROMECAFE's Activities, June 1980

2. Curso de comunicación y transferencia de tecnología.

Se realizó en Santa Rosa de Copán, Honduras, entre el 19 y el 24 de noviembre de 1979, con asistencia de 36 técnicos de nuevo ingreso del Instituto Hondureño del Café - INCAFE. Se vieron técnicas y métodos de extensión cafetalera. Fueron instructores el M.A. Mario Vilches y el Lic. Eduardo Andrade.

3. Curso sobre metodología de la comunicación.

Realizado entre el 12 y el 17 de noviembre, 1979, para 26 técnicos del ISIC, El Salvador. Se cubrieron los principios de la comunicación y se hicieron prácticas de laboratorio sobre comunicación. Los instructores fueron el Ing. Flavio Lazos, el Lic. Eduardo Andrade y el M.A. Mario Vilches.

4. Curso sobre comunicación y extensión en café.

Se realizó en Divisa, Panamá, entre el 23 de enero y el 2 de febrero de 1980. Participaron 35 técnicos, en su mayoría del Programa de Café y Cacao del MIDA, pero también hubo técnicos de RENARE y del Banco de Desarrollo Agropecuario. Además de los principios de la comunicación se hizo énfasis en el papel de las ciencias sociales en el trabajo de extensión. Los instructores fueron: el Dr. Ignacio Ansorena y el Lic. Eduardo Andrade.

5. Curso sobre roya del cafeto. Costa Rica.

Curso realizado en el laboratorio de Fitopatología del MAG entre el 26 y el 30 de mayo de 1980. Participaron 12 técnicos del Programa contra la roya del cafeto del MAG de Costa Rica. Se actualizaron los conocimientos del personal sobre roya y se hizo una práctica de aspersión y uso de equipo. Instructores: J.H. Echeverri y R. Muller.

6. Curso sobre caficultura moderna en Panamá.

Este curso se realizó en Divisa, Panamá, entre el 28 de abril y el 9 de mayo de 1980. Participaron 36 técnicos del Programa de Café, RENARE, DINAI y el Banco de Desarrollo Agropecuario. Se puso énfasis en la caficultura moderna, particularmente en la tecnología desarrollada en El Salvador, dando las bases técnicas que sustentan las prácticas que ahora se recomiendan. Sirvieron de instructores los Ings. Nelson Henríquez Chacón, Héctor Murcia y Jorge Hernán Echeverri y el Dr. Carlos Enrique Fernández.

Excerpted from  
Second Report of PROMECAFE's Activities, June 1980

informe del Dr. Bornemisza fue enviado oportunamente al ISIC.

3. Asesoría a Guatemala sobre muestreo de cafetales

El Ing. Victor Quiroga estuvo en Guatemala la tercera semana de agosto, 1979, asesorando a la ANACAFE sobre una modificación a su sistema de muestreo para prospección de roya, dejando el informe correspondiente.

4. Asesoría a Costa Rica a través de un programa de prevención contra la roya

Además de participar en las sesiones de la Comisión correspondiente, se asesoró al país en la selección de la muestra para una prospección que se hizo durante la segunda y tercera semanas de febrero de 1980. Posteriormente se colaboró procesando los datos, habiendo entregado al Gobierno los cuadros de salida computarizados, que contienen información muy útil sobre la caficultura de Costa Rica.

5. Asesoría a Guatemala en la organización de la asistencia técnica de la ANACAFE

A través de varias visitas de técnicos del IICA a Guatemala y de técnicos de Guatemala al IICA, se ha colaborado en la elaboración de planes para la mejor organización de la asistencia técnica que presta la ANACAFE a sus asociados.

6. Apoyo al Departamento de Café del MIDA

Una misión de PROMECAFE compuesta por el Dr. Raoul Muller y Carlos Enrique Fernández, estuvo en Panamá, para ayudar al Departamento de Café en una asesoría a RENARE, en su esfuerzo por buscar cultivos que, además de remunerativos, dieran protección a la Cuenca de la Zona del Canal. La misión se cumplió durante la primera semana de junio de 1980.

d. Investigación

1. Fitomejoramiento con énfasis en resistencia a roya

El programa regional que sigue PROMECAFE consiste en aprovechar los mejores materiales producidos en otros países para probarlos bajo condiciones de la región con miras a seleccionar genotipos resistentes a la roya y con alta productividad. Se hace en íntima asociación con el CATIE, donde además tienen su sede los técnicos más vinculados a estas

## INSTITUTO INTERAMERICANO DE CIENCIAS AGRICOLAS — OEA

CONVENIO DE OPERACIONES DEL PROGRAMA COOPERATIVOPARA LA PROTECCION Y MODERNIZACION DE LACAFICULTURA DE MEXICO, CENTROAMERICAY PANAMA 1978-1982

Los Ministerios de Agricultura, o sus correspondientes, y los organismos del café de México, Centroamérica y Panamá y el Instituto Interamericano de Ciencias Agrícolas (IICA),

## CONSIDERANDO:

1. Que la caficultura es una de las actividades agrícolas más importantes en el proceso de desarrollo socio-económico de los países de la región.
2. Que enfermedades y plagas graves, como la Roya y la Broca del Café, se han presentado últimamente en la región amenazando muy seriamente la producción cafetera de Centroamérica, México y Panamá.
3. Que el café tiene gran significación económica para los países productores.
4. Que la caficultura con sus industrias complementarias constituye una fuente generadora de ocupación, de ingresos y de divisas en los países de la región.
5. Que la importancia económica actual y futura del café, sumado a los problemas fitopatológicos que amenazan gravemente la caficultura, demandan con urgencia la adopción de medidas específicas de protección y tecnificación orientadas a salvaguardar la producción actual e incrementar su productividad económica.
6. Que la unión de esfuerzos entre los países de la región es un medio necesario, práctico y eficiente para realizar proyectos de investigación, capacitación de personal, extensión, asesoría, y para la adopción de medidas fundamentales tendientes a lograr el mejor desarrollo y protección de la caficultura regional.
7. Que la Junta Directiva del IICA en su XVI Reunión Anual acordó encargar al IICA la organización de un Programa Multinacional de Cooperación Técnica para la protección y modernización de la caficultura en México, Centroamérica y Panamá.
8. Que el IICA y el CATIE han realizado investigaciones de diferente índole en café desde hace muchos años y cuentan con amplia experiencia en adiestramiento de personal y prestación de servicios de asesoría, divulgación, documentación, etc.

-2-

**ACUERDAN:**

Constituir el Programa de Mejoramiento de Café de México, Centroamérica y Panamá y firmar el presente Convenio de Operaciones, en los términos siguientes:

**CAPITULO 1****Identificación y Objetivos****Artículo 1º**

El Programa de Mejoramiento de Café de México, Centroamérica y Panamá es un Programa Cooperativo Regional entre estos países y el Instituto Interamericano de Ciencias Agrícolas. Forman parte de dicho Programa los Ministerios correspondientes, los Organismos del Café, cualquiera sea su nombre específico, el Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) y el Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA) y otros organismos de apoyo a la caficultura de los respectivos países. En lo sucesivo el mismo se denominará "El Programa" o "PROMECAFE".

**Artículo 2º**

El Programa tendrá también Organismos co-patrocinadores que serán aquellas entidades nacionales o internacionales que acepten cooperar con el Programa, tanto técnica como financieramente. Los mismos podrán asistir a las Reuniones del Consejo Asesor, en calidad de Asesores u Observadores.

**Artículo 3º**

El Programa tendrá como objetivo general:

Promover a través de la cooperación regional, la investigación agronómica e impulsar la tecnificación de la caficultura con miras a elevar su productividad en los países miembros.

Para alcanzar este propósito, se dará especial atención al impulso y desarrollo de los programas de mejoramiento genético en la región; al adiestramiento y capacitación intensiva de recursos humanos en técnicas modernas de producción, y protección sanitaria; a la prestación de asesoría general y específica en la elaboración de proyectos nacionales o regionales y en otros aspectos y problemas que sean de interés e incidan en la productividad, protección y modernización de la caficultura en cada uno de los países miembros del Programa.

## CAPITULO II

Organización y SedeArtículo 4º

La organización del Programa comprende:

- a. Un Consejo Asesor
- b. Un Jefe de Programa

Artículo 5º

El Consejo Asesor estará compuesto por sendos representantes de alto rango de los Ministerios de Agricultura o sus correspondientes, de los organismos nacionales del café y de las entidades cooperadoras (CATIE y OIRSA) en razón de un principal y un suplente por cada entidad. En esa forma habrá en el Consejo dos representantes de cada país participante más los representantes del IICA, CATIE y de OIRSA. Representantes de los Organismos Co-patrocinadores podrán asistir a las Reuniones del Consejo Asesor, en calidad de Asesores u Observadores. El Jefe del Programa será el Secretario Ejecutivo del Consejo Asesor.

El Consejo Asesor tendrá las siguientes atribuciones:

- a. Señalar la orientación y la política del Programa.
- b. Conocer y aprobar los Proyectos de Programa-Presupuesto del PROMECAFE.
- c. Fijar los aportes económicos anuales que hará cada uno de los Organismos Nacionales.
- d. Conocer y aprobar los informes de las actividades del Programa.
- e. Conocer y asesorar en la resolución de las iniciativas presentadas por sus miembros o por el Jefe del Programa.
- f. Velar porque las políticas de investigación, capacitación, divulgación, extensión y asesoría que se propongan, sean congruentes con las políticas de los gobiernos y del IICA en estas materias.
- g. Evaluar las realizaciones y la marcha del Programa.

Artículo 6º

El Consejo Asesor se reunirá ordinariamente cada 6 meses y extraordinariamente cuando sea convocado por el Jefe del Programa o a solicitud de dos o más de sus miembros.

Artículo 7º

El Instituto Interamericano de Ciencias Agrícolas (IICA) nombrará un Jefe del

Programa dentro de la categoría de Personal Profesional Internacional, previa consulta con el Consejo Asesor.

#### Artículo 8º

Serán funciones del Jefe del Programa de acuerdo con las normas y procedimientos administrativos del IICA:

- a. Ejercer la Secretaría Ejecutiva del Consejo Asesor.
- b. Elaborar los proyectos de Programa Presupuesto.
- c. Ejecutar los acuerdos del Consejo Asesor.
- d. Administrar los fondos del Programa.
- e. Proponer a la Dirección General del IICA el nombramiento del personal técnico asignado al Programa y nombrar el personal de Servicios Generales del mismo.
- f. Convocar a las Reuniones del Consejo Asesor.
- g. Coordinar las actividades, relacionadas con el PROMECAFE, de los organismos nacionales, las Entidades Cooperadoras, los Organismos Co-patrocinadores y de los expertos que se asignen para trabajar con el Programa.
- h. Tomar todas aquellas iniciativas que a su juicio sean convenientes para la buena marcha y mejoramiento del Programa.

#### Artículo 9º

La Jefatura del Programa estará radicada donde se estime más favorable para el desarrollo de los programas que se establezcan, previo acuerdo con el Consejo Asesor.

### CAPITULO III

#### Recursos

#### Artículo 10º

Los recursos asignados al Programa serán:

- a. Las aportaciones que haga el IICA de su presupuesto regular.
- b. Las aportaciones que hagan los Organismos Nacionales miembros del Programa, según lo establezca anualmente el Consejo Asesor.
- c. Las aportaciones especiales que hagan los Países Miembros de acuerdo con el Artículo 17º de este Convenio.

- d. Las facilidades físicas, de personal profesional y auxiliar, equipo, etc., que aporten los Organismos Nacionales e Instituciones colaboradoras de los países en donde se lleven a cabo actividades del Programa.
- e. Las aportaciones de fondos, personal y facilidades administrativas que asignen las Entidades Cooperadoras -(CATIE y OIRSA)- de acuerdo a su presupuesto anual.
- f. Las aportaciones de fondos o personal que hagan los Organismos Co-patrocinadores.
- g. Las aportaciones de fondos, personal profesional, facilidades físicas o cualquier otro recurso no contemplado anteriormente y que pueda conseguirse para el fortalecimiento del Programa.

#### Artículo 11<sup>o</sup>

Las aportaciones en dinero podrán hacerse en dólares de los Estados Unidos de América o en moneda nacional de los países participantes.

#### Artículo 12<sup>o</sup>

El IICA contribuirá con.

- a. El sueldo del Jefe del Programa.
- b. Facilidades físicas y administrativas para el Programa.
- c. Las aportaciones que se establezcan anualmente en su Programa-Presupuesto para el PROMECAFE.

#### Artículo 13<sup>o</sup>

Los países miembros del Programa contribuirán, conforme a los presupuestos que el Consejo Asesor apruebe anualmente, con fondos para:

- a. El pago de sueldo y gastos de viaje de personal profesional, internacional y auxiliar.
- b. El pago de becas para cursos nacionales e internacionales.
- c. El pago de publicaciones, materiales y equipo.
- d. El pago de servicios, gastos administrativos y otros no previstos que sean necesarios para la operación del Programa.

#### Artículo 14<sup>o</sup>

Las Entidades Cooperadoras contribuirán conforme a sus presupuestos, y como complemento a las aportaciones de los países miembros, con:

- a. Personal profesional internacional.

- b. Gastos de viaje de personal profesional internacional.
- c. Becas para cursos internacionales.
- d. Facilidades físicas y administrativas en sus oficinas de los países miembros del Programa.
- e. Facilidades de laboratorios, bibliotecas, plantaciones de café y otras instalaciones y servicios que posean y que sean de utilidad para cumplir con los objetivos del Programa.

#### CAPITULO IV

##### Aportaciones y Programa-Presupuesto

###### Artículo 15<sup>a</sup>

Las aportaciones regulares anuales de cada uno de los países miembros para financiar las actividades del Programa, se establece por un monto inicial equivalente a cuarenta mil dólares de los Estados Unidos de América. Esta contribución será revisada cada año por el Consejo Asesor al aprobar el Programa-Presupuesto de PROMECAFE y deberá ser aportada dentro de los tres primeros meses del año.

###### Artículo 16<sup>a</sup>

Cada uno de los países miembros podrá hacer aportaciones adicionales las cuales se utilizarán para la realización de actividades específicas del Programa en el respectivo país.

###### Artículo 17<sup>a</sup>

La Secretaría Ejecutiva someterá anualmente a la consideración y aprobación del Consejo Asesor, un proyecto de Programa-Presupuesto. En el mismo se incluirán tanto las actividades como las necesidades de fondos y las aportaciones de los países miembros del Programa, de las Entidades Cooperadoras y de Organismos Co-patrocinadores.

#### CAPITULO V

##### Disposiciones Generales y Transitorias

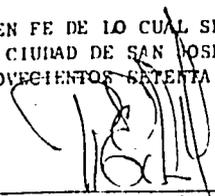
###### Artículo 18<sup>a</sup>

El presente Convenio tendrá una duración de cinco años, a partir del 1<sup>o</sup> de enero de 1978 y podrá ser renovado automáticamente por otro período igual con la aceptación del IICA y con la mayoría de los países miembros del Programa.

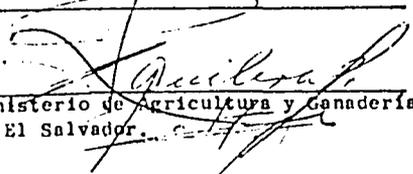
Artículo 19<sup>a</sup>

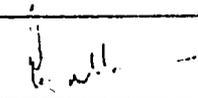
El Consejo Asesor adoptará un reglamento del Programa y del Consejo Asesor. Se encargará a la Jefatura del Programa la formulación del proyecto correspondiente.

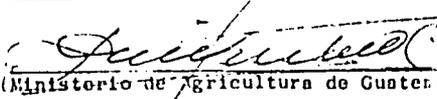
EN FE DE LO CUAL SE FIRMA EL PRESENTE CONVENIO DE OPERACIONES, EN OCHO COPIAS, EN LA CIUDAD DE SAN JOSE DE COSTA RICA, A LOS TREINTA Y UN DIAS DEL MES DE ENERO DE MIL NOVECIENTOS SETENTA Y OCHO.

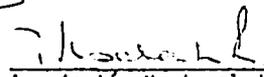
  
Ministerio de Agricultura y Ganadería de Costa Rica.

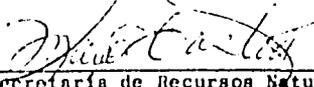
Oficina del Café de Costa Rica.

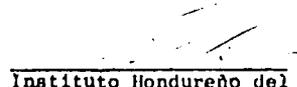
  
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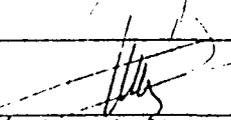
  
Compañía Salvadoreña del Café

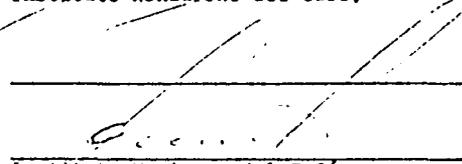
  
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Asociación Nacional del Café de Guatemala.

  
Secretaría de Recursos Naturales de Honduras.

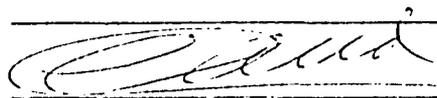
  
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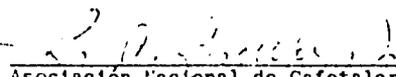
  
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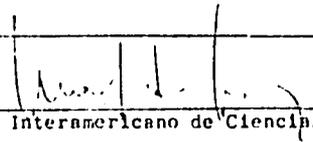
  
Instituto Mexicano del Café.

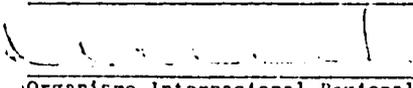
Ministerio de Agricultura de Nicaragua.

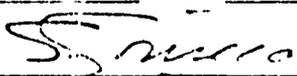
Instituto Nicaraguense del Café.

  
Ministerio de Desarrollo Agropecuario de Panamá.

  
Asociación Nacional de Cafetaleros de Panamá.

  
Instituto Interamericano de Ciencias Agrícolas.

  
Organismo Internacional Regional de Sanidad Agropecuaria.

  
Centro Agronómico Tropical de Investigación y Enseñanza.

REGIONAL COFFEE PEST CONTROL PROJECT  
 SUMMARY AID INPUTS BUDGET BY ACTIVITIES  
 (IN US \$000)

<u>ACTIVITIES</u>	<u>5/81 to 9/30/81 1981</u>	<u>9/30/82 1982</u>	<u>9/30/83 1983</u>	<u>9/30/84 1984</u>	<u>5/31/86 1985/86</u>	<u>Total</u>
I. Biology of the Rust	149	126	135	152	57	619
II. Control of Broca	64	83	85	95	52	379
III. Residue Analysis	---	46	107	118	40	311
IV. Development and Reproduction of Resistant Varieties	79	385	191	208	97	960
V. Development and Adaptation of Appropriate Technology for Small Farmers	2	123	116	154	158	553
VI. Information Network and Data Base Development	---	38	37	15	14	104
VII. Evaluation	---	6	22	6	26	60
VIII. Overhead	---	<u>44</u>	<u>46</u>	<u>53</u>	<u>21</u>	<u>164</u>
Sub-Total	294	851	739	801	465	3,150
IX. Contingencies	<u>56</u>	<u>88</u>	<u>81</u>	<u>80</u>	<u>45</u>	<u>350</u>
Total	<u>350</u>	<u>939</u>	<u>820</u>	<u>881</u>	<u>510</u>	<u>3,500</u>

IDI: PBLapera  
 FA: REduardo/r1  
 4-9-81

REGIONAL COFFEE PEST CONTROL PROJECT  
 DETAILED AID INPUTS BUDGET BY ACTIVITIES  
 (IN US \$000)

COST CODE	ACTIVITIES	5/81 to 9/30/81		9/30/82		9/30/83		9/30/84		5/31/86 1985/86		Total	
		P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT
I.	<u>BIOLOGY OF THE RUST</u>												
	a) 1 Long Term Plant Pathologist	---	---	9	41	12	36	12	41	3	22	36	140
	b) 1 Short Term Epidemiologist	---	---	2	14	2	16	2	18	---	---	6	48
	b) 1 Short Term Biological Control of Coffee Pests	---	---	2	14	2	16	2	18	---	---	6	48
	d) 3 Contract Agronomist Technicians	---	---	36	21	36	24	36	27	---	---	108	72
	Personnel Costs	---	---	49	90	52	92	52	104	3	22	156	308
	g) Travel and Per Diem	---	---	11	15	16	16	16	16	5	5	47	47
	g) In-Country Travel	1	1	3	3	3	3	3	3	4	4	14	14
	i) Greenhouse	81	81	---	---	---	---	---	---	---	---	81	81
	h) Laboratory Equipment	66	66	3	3	3	3	3	3	4	4	79	79
	h) Office Supplies and Materials	1	1	2	2	2	2	3	3	4	4	12	12
	e) Spraying Supplies and Equipment	---	---	10	10	10	10	12	12	15	15	47	47
	k) In-Country Training and Materials	---	---	7	7	10	10	11	11	3	3	31	31
	TOTAL I	149	149	49	126	52	135	52	152	3	57	156	619
II.	<u>CONTROL OF BROCA</u>												
	a) 1 Long Term Entomologist	---	---	9	41	12	36	12	41	3	22	36	140
	b) 1 Short Term Expert in Biological Control of Coffee Pests	---	---	2	14	2	16	1	18	1	10	6	58
	Personnel Costs	---	---	11	55	14	52	13	59	4	32	42	198

COST CODE	ACTIVITIES	5/81 to 9/30/81		9/30/82		9/30/83		9/30/84		5/31/86 1985/86		Total	
		1981 P/M	AMT	1982 P/M	AMT	1983 P/M	AMT	1984 P/M	AMT	1985/86 P/M	AMT	P/M	AMT
II.	<u>CONTROL OF BROCA (CONT.)</u>												
	g) Travel and Per Diem	---		11		15		16		5			47
	k) In-Country Training and Materials	---		7		8		9		3			27
	h) Office Supplies		2	2		2		2		2			10
	g) In-Country Travel		1	3		3		3		4			14
	i) Greenhouse Construction and Equipment		40	---		---		---		---			40
	h) Chemicals and Field Supplies	---		3		3		4		4			14
	h) Laboratory Equipment		21	2		2		2		2			29
	TOTAL II		64	11	83	14	85	13	95	4	52	42	379
III.	<u>RESIDUE ANALYSIS (PROMECAFE, OIRSA-ICAITI)</u>												
	b) 2 Short Term Residue and Registration Specialists	---	---	4	28	6	48	6	54	---	---	16	130
	Personnel Costs	---	---	4	28	6	48	6	54	---	---	16	130
	n) Residue Analysis - ICAITI	---		7		42		44		23			116
	h) Spraying Chemicals and Supplies	---		2		3		3		2			10
	o) Sample Collection and Shipment	---		4		6		8		6			24
	k) Training - Seminars	---		5		8		9		9			31
	TOTAL III.	---	---	4	46	6	107	6	118	40		16	311
IV.	<u>DEVELOPMENT AND REPRODUCTION OF RESISTANT VARIETIES</u>												
	a) 1 Long Term Plant Breeder	---	---	9	41	12	36	12	41	3	22	36	140
	b) 1 Short Term Tissue Culture Expert	---	---	1	7	2	16	2	18	1	10	6	51
	d) 3 Local Contract Laboratory and Field Assistants	---	---	12	6	24	20	36	27	---	---	72	53
	Personnel Costs	---	---	22	54	38	72	50	86	4	32	114	244

COST CODE	ACTIVITIES	5/81 to 9/30/81		9/30/82		9/30/83		9/30/84		5/31/86 1985/6		Total	
		P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT
IV.	<u>DEVELOPMENT AND REPROD. OF RESISTANT VARIETIES (CONT.)</u>												
g)	Travel and Per Diem	---		11		15		16		5		47	
h)	Vehicle - Pick-Up	10		---		---		---		---		10	
g)	Vehicle Maintenance & Operation	1		3		3		3		4		14	
i)	Greenhouse Construction	---		80		---		---		---		80	
l)	Progeny Testing at VICOSA, Brazil and CIFC, Portugal	---		107		56		54		---		217	
k)	Short Term Training at VICOSA, Brazil and CIFC, Portugal	---		30		32		34		36		132	
m)	Pedigreeing/Processing/Distribution of Seeds	---		8		10		12		16		46	
h)	Laboratory Equip. and Materials for Tissue Culture	28		3		3		3		4		41	
j)	Lab. Construction for Tissue Culture	---		42		---		---		---		42	
m)	Equipment and Materials for Seed Reprod. "Beneficio"	40		47		---		---		---		87	
	TOTAL IV.	79		22 385		38 191		50 208		4 97		114 960	
V.	<u>DEVELOPMENT AND ADAPTATION OF APPROPRIATE TECHNOLOGY FOR SMALL FARMERS - PROMECAFE</u>												
a)	1 Long Term Extension/Commun. Specialist	---	---	---	---	12	36	12	41	3	25	27	102
b)	1 Short Term System Analyst	---	---	6	42	2	16	2	18	2	20	12	96
b)	1 Short Term Sociologist	---	---	6	42	2	16	2	18	2	20	12	96
	Personnel Costs	---	---	12	84	16	68	16	77	7	65	51	294
f)	Logistical Administrative Support for Area Profiles and Field Studies	---		9		12		17		18		56	
g)	In-Country Travel	2		6		7		7		8		30	
p)	Profile Development -Computer Services	---		4		6		8		10		28	
k)	Training and Materials	---		10		13		25		32		80	
k)	Publications/Training	---		10		10		20		25		65	
	TOTAL V	2		12 123		16 116		16 154		7 158		51 553	

REGIONAL COFFEE PEST CONTROL PROJECT - DETAILED AID INPUTS BY ACTIVITIES (IN US \$000)

COST CODE	ACTIVITIES	5/81 to 9/30/81		9/30/82		9/30/83		9/30/84		5/31/86 1985/86		Total	
		P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT
VI.	<u>INFORMATION NETWORKS AND DATA BASE DEVELOPMENT</u>												
	b) 1 Short Term Specialist	---	---	3	21	3	24	---	---	---	---	6	45
	Personnel Costs	---	---	3	21	3	24	---	---	---	---	6	45
	f) Logistical/Admin. Support	---	---		5		6		6		4		21
	h) Data Info Procurement	---	---		12		7		9		10		38
	TOTAL VI.	---	---		38		37		15		14		104
VII.	<u>EVALUATION</u> - AID Contracted Personnel	---	---				16		---		20		36
	Yearly Review Meetings	---	---		6		6		6		6		24
	TOTAL VII	---	---		6		22		6		26		60
VIII.	<u>OVERHEAD</u>	---	---		44		46		53		21		164
IX.	<u>CONTINGENCIES</u>	---	---		56		85		75		80		350
	PROJECT TOTAL	---	---		350		939		820		881		510
		-----	-----		-----		-----		-----		-----		-----
													3,500

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REGIONAL COFFEE PEST CONTROL PROJECT  
DETAILED COUNTERPART INPUT BUDGET BY FISCAL YEAR  
IN 000'S

	5/81 to 9/30/81 1981		9/30/82 1982		9/30/83 1983		9/30/84 1984		5/31/86 1985/86		TOTAL	
	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT
<u>PRCMECAFE - IICA</u>												
C) 1 Director 80%	5	14	12	33	12	35	12	36	15	48	56	166
C) 1 Communications Specialist 100%	-	-	9	11	12	26	12	27	3	7	36	71
C) 1 Project Administrator (New) 100%	-	-	9	41	12	36	12	41	3	22	36	140
C) 1 Plant Pathologist 100%	-	-	9	26	12	35	12	37	3	10	36	108
C) 1 Emeritus Advisor 100%	-	-	9	6	12	6	12	6	3	2	36	20
C) 1 IFCC Economist 80%	-	-	9	21	12	28	12	30	3	8	36	87
D) 4 Coffee Institute Coordinators 50%	-	-	36	23	48	30	48	32	12	8	144	93
G) Travel & Per Diem	-	5	-	30	-	30	-	30	-	10	-	105
P) Computer Time	-	3	-	5	-	5	-	5	-	3	-	21
F) Administrative Support	-	5	-	10	-	10	-	10	-	6	-	41
Q) Publications	-	4	-	7	-	7	-	7	-	2	-	27
	<b>5</b>	<b>31</b>	<b>93</b>	<b>213</b>	<b>120</b>	<b>248</b>	<b>120</b>	<b>261</b>	<b>42</b>	<b>126</b>	<b>380</b>	<b>879</b>

<u>C A T I E</u>												
C) 1 Plant Physiologist 50%	-	-	9	13	12	18	12	18	3	5	36	54
C) 1 Other CATIE Scientist 50%	-	-	9	13	12	18	12	18	3	5	36	54
E) 2 Laborers 100%	-	-	18	4	24	5	24	5	6	2	72	16
J) Green House Facilities	-	-	-	1	-	1	-	1	-	1	-	4
M) Seed Preparation Center "Beneficio"	-	-	-	2	-	2	-	2	-	2	-	8
M) Seed Storage Warehouse	-	-	-	1	-	1	-	1	-	1	-	4
G) Transportation	-	-	-	2	-	2	-	2	-	2	-	8
F) Office Space	-	-	-	1	-	1	-	1	-	1	-	4

C A T I E	5/81 to 9/30/81 1981		9/30/82 1982		9/30/83 1983		9/30/84 1984		5/31/86 1985/86		TOTAL	
	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT
K) Classrooms	-	-	-	1	-	1	-	1	-	1	-	4
F) Computer Time	-	-	-	3	-	3	-	10	-	10	-	26
J) Variety Collection	-	-	-	3	-	3	-	3	-	3	-	12
J) Land for Experimental Plots	-	-	-	2	-	2	-	2	-	2	-	8
E) Local Labor Green House Const.	-	1	-	-	-	-	-	-	-	-	-	1
	-	1	36	46	48	57	48	64	12	35	144	203

<u>O I R S A</u>												
C) 1 Director 25%	-	-	9	7	12	10	12	10	3	3	36	30
C) 4 Scientists 20%	-	-	36	15	48	21	48	22	12	6	144	64
C) 3 Agronomist Technicians	-	-	27	14	36	19	36	20	9	5	108	58
E) 2 Laborers	-	-	18	3	24	4	24	5	6	1	72	13
E) Local Labor Green House Const.	-	2	-	-	-	-	-	-	-	-	-	2
G) Travel & Per Diem	-	-	-	4	-	5	-	5	-	2	-	16
G) Transportation	-	-	-	8	-	9	-	9	-	3	-	29
F) Administrative Support	-	-	-	9	-	12	-	12	-	3	-	36
E) 4 Agronomists 100%	-	-	36	58	48	81	48	85	12	22	144	246
	-	2	126	118	168	161	168	168	42	45	504	494

NATIONAL INPUTS BY COUNTRYGUATEMALA

C) 3 Agronomists	-	-	27	27	36	38	36	40	9	11	108	116
C) 9 Agronomist Technicians	-	-	81	41	108	57	108	60	27	16	324	174
E) 10 Laborers	-	-	90	27	120	38	120	40	30	10	360	115
G) Travel and Per Diem	-	-	-	5	-	7	-	7	-	2	-	21
G) Transportation (8 vehicles)	-	-	-	7	-	10	-	10	-	3	-	30

	5/81/to 9/30/81 1981		9/30/82 1982		9/30/83 1983		9/30/84 1984		5/31/86 1985/86		TOTAL	
	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT
J) Laboratory, Land and Office Facil.	-	2	-	7	-	10	-	10	-	2	-	31
F) Administrative Support	-	-	-	10	-	13	-	14	-	4	-	41

## Total Guatemala

	2	198	124	264	173	264	181	66	48	792	528
--	---	-----	-----	-----	-----	-----	-----	----	----	-----	-----

HONDURAS

C) 3 Agronomists	-	27	27	36	38	36	40	9	11	108	116
C) 9 Agronomist Technicians	-	81	41	108	57	108	60	27	16	324	174
E) 10 Laborers	-	90	27	120	38	120	40	30	10	360	115
G) Travel and Per Diem	-	-	5	-	7	-	7	-	2	-	21
G) Transportation (8 vehicles)	-	-	7	-	10	-	10	-	3	-	30
J) Laboratory, Land and Office Facil.	2	-	7	-	10	-	10	-	2	-	31
F) Administrative Support	-	-	10	-	13	-	14	-	4	-	41

## Total Honduras

	-	2	198	124	264	173	264	181	66	48	792	528
--	---	---	-----	-----	-----	-----	-----	-----	----	----	-----	-----

EL SALVADOR

C) 2 Agronomists	-	-	18	18	24	25	24	26	6	7	72	76
C) 6 Agronomist Technicians	-	-	54	27	72	38	72	40	18	11	216	116
E) 6 Laborers	-	-	54	16	72	23	72	24	18	6	216	69
G) Travel and Per Diem	-	-	-	4	-	5	-	5	-	1	-	15
G) Transportation (5 vehicles)	-	-	-	5	-	6	-	6	-	2	-	19
J) Laboratory, Land and Office Facil.	-	2	-	7	-	10	-	10	-	2	-	31
F) Administrative Support	-	-	-	6	-	9	-	9	-	2	-	26

## Total El Salvador

	-	2	126	83	168	116	168	120	42	31	504	352
--	---	---	-----	----	-----	-----	-----	-----	----	----	-----	-----

	5/81/to 9/30/81 1981		9/30/82 1982		9/30/83 1983		9/30/84 1984		5/31/86 1985/86		TOTAL	
	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT
<u>NICARAGUA</u>												
C) 1 Agronomist	-	-	9	9	12	13	12	13	3	4	36	39
C) 5 Agronomist Technicians	-	-	45	23	60	32	60	33	15	9	180	97
E) 2 Laborers	-	-	18	5	24	8	24	8	6	2	72	23
G) Travel and Per Diem	-	-	-	3	-	4	-	4	-	1	-	12
G) Transportation (6 vehicles)	-	-	-	5	-	7	-	7	-	2	-	21
J) Laboratory, Land and Office Facil.	-	2	-	7	-	10	-	10	-	2	-	31
F) Administrative Support	-	-	-	4	-	5	-	5	-	2	-	16
<hr/>												
Total Nicaragua	-	2	72	56	95	79	96	80	24	22	288	239
<u>COSTA RICA</u>												
C) 1. Agronomist	-	-	9	9	12	13	12	13	3	4	36	39
C) 5 Agronomist Technicians	-	-	45	23	60	32	60	33	15	9	180	97
E) 2 Laborers	-	-	18	5	24	8	24	8	6	2	72	23
G) Travel and Per Diem	-	-	-	3	-	4	-	4	-	1	-	12
G) Transportation (6 vehicles)	-	-	-	5	-	7	-	7	-	2	-	21
J) Laboratory, Land and Office Facil.	-	2	-	7	-	10	-	10	-	2	-	31
F) Administrative Support	-	-	-	4	-	5	-	5	-	2	-	16
<hr/>												
Total Costa Rica		2	72	56	96	79	96	80	24	22	288	239

	5/81/to 9/30/81 1981		9/30/82 1982		9/30/83 1983		9/30/84 1984		5/31/86 1985/86		TOTAL	
	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT	P/M	AMT
<b>PANAMA</b>												
C) 1 Agronomist	-	-	9	9	12	13	12	13	3	4	36	39
C) 3 Agronomist Technicians	-	-	27	14	36	19	36	20	9	5	108	58
C) 2 Laborers	-	-	18	5	24	8	24	8	6	2	72	23
G) Travel and Per Diem	-	-	-	2	-	3	-	3	-	1	-	9
G) Transportation (4 vehicles)	-	-	-	4	-	5	-	5	-	1	-	15
J) Laboratory, Land and Office Facil.-	-	2	-	7	-	10	-	10	-	2	-	31
F) Administrative Support	-	-	-	3	-	4	-	4	-	1	-	12
<b>Total Panama</b>	<b>-</b>	<b>2</b>	<b>54</b>	<b>46</b>	<b>72</b>	<b>62</b>	<b>72</b>	<b>63</b>	<b>18</b>	<b>16</b>	<b>216</b>	<b>187</b>
<b>Total National Contributions</b>	<b>-</b>	<b>12</b>	<b>720</b>	<b>487</b>	<b>960</b>	<b>682</b>	<b>960</b>	<b>705</b>	<b>240</b>	<b>187</b>	<b>2,880</b>	<b>2,073</b>
<b>Total Regional Contributions</b>	<b>5</b>	<b>34</b>	<b>255</b>	<b>377</b>	<b>336</b>	<b>466</b>	<b>336</b>	<b>493</b>	<b>96</b>	<b>206</b>	<b>1,028</b>	<b>1,576</b>
<b>Total Counterpart Contributions</b>	<b>5</b>	<b>46</b>	<b>975</b>	<b>864</b>	<b>1,296</b>	<b>1,148</b>	<b>1,296</b>	<b>1,198</b>	<b>336</b>	<b>393</b>	<b>3,908</b>	<b>3,649</b>

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## ANNEX K

## FINANCIAL STATEMENT ANALYSIS

INTER AMERICAN INSTITUTE OF AGRICULTURAL COOPERATION (IICA)  
(ORGANIZATION OF AMERICAN STATES)

IICA is regularly audited by Price Waterhouse and Company which states in its audit reports that IICA's accounting practices differ from generally accepted accounting principles for the preparation of financial statements for profit-oriented activities, further stating that IICA's practices are similar to the accounting practices used by other non-profit organizations. Deviations from generally accepted accounting practices include:

1. Uncollected quotas are not evaluated as to their collectibility and no provision for uncollectible accounts is made.

2. Financial statements do not include the accumulated cost of land, buildings, vehicles, equipment and other fixed assets. Acquisitions of new assets are considered charges against current operations.

Such deviations are not uncommon in governmental accounting practices. The funds administered by IICA are accounted for according to their source and purpose and are segregated into four separate funds. These are briefly discussed below:

a) Regular Fund The activities of this Fund are financed mainly through voluntary quota contributions of the OAS Member States. The purpose of this Fund is to finance the programmed and budgeted activities of IICA. All accounting records are kept in U.S. dollars with operations using currencies of Member Countries being converted to U.S. dollars at the monthly average rate of exchange of the respective currency. Attached as Exhibit I to this Annex is IICA's Comparative Statement of Assets, Liabilities and Working Fund Balance for the years ended June 30, 1978, 1979 and December 31, 1979.

Exhibit III, Statement of Income Expenditures and Changes in General Working Fund for the years 1977 through December 31, 1979 shows an increase of 22% in Member Country quotas,

## ANNEX K

10 million in 1979 vs. 8.2 million in 1977. Excess Income over Expenditures during this period showed a deterioration, therefore the Fund Balance suffered a liquidity problem and it was necessary to utilize the line of credit at the American Security Bank.

The change of fiscal year July 1st to June 30 to agree with the calendar year Jan-Dec beginning 1980 accounts in part for the minor excess of Income over Expenditures \$35,000 for the period ended 12/31/79 vs. \$290,000 for the period ended 6/30/79.

In accordance with instructions from IICA's Board of Directors, IICA has been successful in obtaining external resources in addition to their normal country quotas.

During the second semester of 1979 which represents only a six-month period the external financing continued to grow. The financing from the Regular Fund represented only 54.6%, the SIMON BOLIVAR FUND 9%, and other resources outside normal country quotas 36.4%.

Regular quotas for 1981 have been budgeted with a 19.8% increase over last period. Therefore 1981 quotas amount to US\$15,357,733 which represent 47.0% of total resources.

b) International Institutions These resources are received by IICA through specific agreements, contracts, contributions, donations, that fall within IICA's present policies and activities. For 1981 resources under International Institutions have been budgeted at the 4.8 million level representing 14.7% of the total IICA resources.

c) National Institutions Resources available under this category are constituted by the special contributions of various member country institutions in conformance with agreements and bilateral contracts to carry out specific projects of high priority that fall within IICA's policies. Resources for 1981 reach \$10.0 million or 30.7% of total resources. For additional detail see Exhibit II Statement of Assets, Liabilities and Working Fund Balance.

d) Simón Bolívar Fund The Simón Bolívar Fund was approved in Caracas, Venezuela in May 1974. This fund for rural development of Latin America and the Caribbean

## ANNEX K

was established with a \$10.0 million contribution by the Venezuelan Government and subsequent member country contributions. For 1981 a total of \$2.5 million has been budgeted representing 7.6% of total 1981 resources. For financial statements of this Fund see Exhibits II and IV.

Summary of Total Resources Approved  
by Source of Financing

<u>Source</u>	<u>Approved 1980</u>		<u>Budgeted 1981</u>	
	<u>Amount</u>	<u>Percent</u>	<u>Amount</u>	<u>Percent</u>
Regular Fund	12,757	47	15,358	47
<u>External Resources</u>				
International Institutions	3,872	14	4,801	15
National Institutions	7,744	28	10,055	31
SIMON BOLIVAR FUND	3,000	11	2,500	7
	<u>27,373</u>	<u>100</u>	<u>32,714</u>	<u>100</u>

PROMECAFE

The purpose of PROMECAFE is to improve the production and productivity of coffee in the region through the application of new methodologies. PROMECAFE initiated operations through the signing of an agreement between the Central American Isthmus countries, Mexico and IICA in 1978 for a five-year period. The contributions are fixed on a yearly basis and for 1981 it has been budgeted at \$40,000 per country or a level of \$240,000 in total. Nicaragua does not contribute.

As counterparts, the countries and IICA provide the required technical and financial support including the position of Chief of the Program.

The 1981 Budget of PROMECAFE is broken down as follows:

<u>Description</u>	<u>IICA's</u> <u>Regular</u> <u>Budget</u>	<u>Country</u> <u>Contri-</u> <u>butions</u>	<u>Total</u>
Personnel	50,628	71,165	121,793
Operations	9,372	154,335	163,707
Equipment	---	5,000	5,000
General Services	---	9,500	9,500
TOTAL	<u>60,000</u>	<u>240,000</u>	<u>300,000</u>

## ANNEX K

Conclusion

IICA has been able to increase its activities primarily due to its success in attracting financial support from International institutions. It has been able to maintain its sound financial position and, at the same time increase country quota requirements by only small amounts. IICA is very capable of providing PROMECAFE with the financial support in the execution of this project.

INTER AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES (IICA)  
REGULAR FUND

Page 1 of 2

EXHIBIT I

STATEMENT OF ASSETS, LIABILITIES AND WORKING FUND BALANCE  
AS OF JUNE 30  
(US \$000)

	AUDITED			
	12/31/79	6/30/79	6/30/78	6/30/77
<b><u>ASSETS</u></b>				
Cash on Hand and In Banks	1,132	1,067	861	497
Temporary Investment	84	---	1,250	---
Uncollected Member States Quotas	2,755	3,168	1,586	1,655
Accounts Receivable	695	555	287	221
Inventories	193	212	162	84
Prepaid Expenses	332	319	170	60
Other Assets	16	16	12	12
Sub-Total	<u>5,207</u>	<u>5,337</u>	<u>4,328</u>	<u>2,529</u>
Special Funds, Contracts, Agreements and Grants <u>1/</u>	<u>1,328</u>	<u>1,157</u>	<u>893</u>	<u>1,184</u>
Total Assets	<u>6,535</u>	<u>6,494</u>	<u>5,221</u>	<u>3,713</u>
<b><u>LIABILITIES AND GENERAL WORKING FUND</u></b>				
Accounts Payable:				
American Security Bank (Line of Credit 3.0 Mil.)	525			
Simón Bolívar Fund	---	1,055	---	---
Advances Received for Operating Expenses	68	169	---	121
Other Liabilities	547	351	232	176
Rotating Fund <u>2/</u>	945	622	759	371
Reserves	---	---	54	40
Sub-Total	<u>2,085</u>	<u>2,197</u>	<u>1,045</u>	<u>708</u>
<b>SPECIAL FUNDS</b>				
Contracts, Agreements and Grants	1,263	1,007	1,240	178
General Working Fund Balance	3,187	3,290	2,936	2,827
Total Liabilities and Fund Balance	<u>6,535</u>	<u>6,494</u>	<u>5,221</u>	<u>3,713</u>

STATEMENT OF ASSETS, LIABILITIES AND WORKING FUND BALANCE

FOOTNOTES

- 1/ Balance remaining on agreements with Institutions or Member Countries for specific purposes.
  
- 2/ Remaining balances of funds established for specific purposes such as for scholarships, replacement of equipment, publications, personnel transfers, and benefits and construction.

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## EXHIBIT II

## INTER AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES (IICA)

## SIMON BOLIVAR &amp; NATIONAL FUND

STATEMENT OF ASSETS, LIABILITIES AND WORKING FUND BALANCE  
AS OF DECEMBER 31, 1979

(US \$000)

	<u>SIMON BOLIVAR FUND</u>	<u>NATIONAL FUND</u>
<u>ASSETS</u>		
Cash on Hand and in Banks	200	190
Temporary Investments	3,655	156
Accounts Receivable	20	85
Prepaid Expenses	---	14
Advances for Operating Expenses	68	---
Other Assets	---	2
	<u>3,943</u>	<u>447</u>
	=====	=====
 <u>LIABILITIES AND GENERAL WORKING FUND</u>		
Accounts Payable and Other Liabilities	---	467
Retained Excess of Income Over Expenditures	3,131	(45)
General Working Fund	812	---
Reserves and Provisions	---	25
	<u>3,943</u>	<u>447</u>
	=====	=====

INTER AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES (IICA)  
REGULAR FUND

EXHIBIT III

STATEMENT OF INCOME, EXPENDITURES AND CHANGES IN GENERAL WORKING FUND  
FOR FISCAL YEARS ENDED

(US \$000)

	AUDITED			
	12/31/79	6/30/79	6/30/78	6/30/77
<u>INCOME</u>				
Member Country Quotas	5,947	9,994	9,050	8,191
Other Income	4	5	---	5
	<u>5,951</u>	<u>9,999</u>	<u>9,050</u>	<u>8,196</u>
<u>EXPENDITURES</u>				
Personnel Costs	3,844	6,448	5,862	5,218
Operating Costs	880	1,144	1,495	1,348
General Services	512	770	590	606
General Costs, Reserves and Equipment and Furniture <u>1/</u>	680	1,347	1,079	892
	<u>5,916</u>	<u>9,709</u>	<u>9,026</u>	<u>8,064</u>
<u>EXCESS OF INCOME OVER EXPENDITURES</u>	35	290	24	132
<u>TRANSFER TO GENERAL WORKING FUND</u>	63	85	85	40
<u>TRANSFERS FROM GENERAL WORKING FUND</u>	(202)	(20)	---	---
	<u>(104)</u>	<u>355</u>	<u>109</u>	<u>172</u>
FUND BALANCE - BEGINNING OF YEAR	<u>3,291</u>	<u>2,936</u>	<u>2,827</u>	<u>2,655</u>
FUND BALANCE - END OF YEAR	<u>3,187</u>	<u>3,291</u>	<u>2,936</u>	<u>2,827</u>
	<u>=====</u>	<u>=====</u>	<u>=====</u>	<u>=====</u>

1/ Includes the following transfers to CATIE 1977 \$500; 1978 \$530 6/30/79 \$551;  
12/31/79 \$289

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INTER AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES (IICA)  
SIMON BOLIVAR

EXHIBIT IV

STATEMENT OF INCOME, EXPENDITURES AND CHANGES IN GENERAL WORKING FUND  
FOR FISCAL YEARS ENDED JUNE 30, 1979 AND DECEMBER 31, 1979

(IN US\$000)

	<u>For 6 Months Ended 12/31/79</u>	<u>For Year Ended 6/30/79</u>
Contributions Received from Member States	44	2,054
Other Income	<u>229</u>	<u>315</u>
	273	2,369
Expenditures	<u>967</u>	<u>1,777</u>
	(694)	592
Retained Excess of Income Over Expenditures at Beginning of Year	<u>3,825</u>	<u>3,232</u>
Retained Excess of Budget end of Period	<u>3,131</u> =====	<u>3,824</u> =====
General Working Fund Beginning of Period	800	720
Appropriation to the General Fund	<u>13</u>	<u>80</u>
General Working Fund End of Period	<u>813</u> =====	<u>800</u> =====

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## ANNEX K

Financial Plan Cost NarrativeROCAP Contribution - IICA - PROMECAFE

A summary narrative of the major cost inputs applicable to all activities follow.

a) Professional Staff

Professionals recruited internationally for long-term service in the Project have been estimated to cover a three-year period. These professionals will be IICA employees and as such will follow IICA's rules and regulations which are, ultimately, those of the United Nations system as adopted by the Organization of American States and IICA.

Personnel salaries were based on the latest salary scale and include additional benefits and moving expenses. Estimates have been made on a family of two adults and two dependent children over 12 years old. Total costs for the three-year period amount to \$140,000. For additional detail see the chart "Estimated Personnel Service Cost Based on IICA's Cost Structure". For the first nine-month period the cost for one technician is \$41,000 and has been arrived at as follows: 9/12 of \$20,230 salary for year 1 or \$15,174 plus 9/12ths of benefits or \$11,007, plus all moving costs \$14,750 for a total of \$40,931. Following the same rationale \$36,000 was budgeted for fiscal year 1983, \$41,000 for 1984 and \$22,000 for the three months in 1985.

b) Consultants - Short-Term

Standard cost used was based on U.S. consultants rates. This monthly cost for the first year has been arrived at as follows:

Consultant Salary 22 days x \$180	\$3,960.00
Per Diem - Average C.A. rate 30 days x \$60	1,800.00
Round trip air fare (Wash D.C./San Jose,C.R.)	800.00
Other Costs	<u>440.00</u>
	\$7,000.00

ESTIMATED PERSONNEL SERVICE COSTS

BASED ON IICA'S COST STRUCTURE

	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>
I. <u>Salary</u> P-3 step 5, 7 and 9 with family	<u>20,230</u>	<u>21,254</u>	<u>22,223</u>
Subsequent increases estimated at 2 steps per year			
II. <u>Benefits</u> (Based on 4 people)	<u>14,681</u>	<u>15,479</u>	<u>16,239</u>
Family Subsidy 450 per child per year x 2 + 5% year increase	900	945	992
Education Subsidy - 640 per child 12 to 25 x 2 + 5% yr. incr	1,280	1,344	1,411
Post Differential 9 x 889 (Ajuste por sede de trabajo)	8,001		.
"    "    9 x 934 ( " " " )		8,406	
"    "    9 x 975 ( " " " )			8,775
Employees Contribution to Retirement Fund 14% of gross 27,300, 29,060 and 30,760	3,822	4,068	4,306
Employees Contribution to Life Ins. + 5% increase per year	295	310	325
"    "    to Hospital Insurance + 5%	363	381	400
"    "    to Accident Insurance	20	25	30
III. <u>Moving Expenses</u>	<u>14,750</u>	<u>2,800</u>	<u>12,000</u>
Assignment to Post Specific amount of \$2,750 plus the estimated value of Round Trip Tickets x 3.0 2,750 + (700 x 4 = 2,800 x 3) = 8,400	11,150		
Installation Subsidy \$60 x 4 x 15 days (average per diem)	3,600		
Home Leave 4 Round Trip Tickets at 700		2,800	
Repatriation Costs			<u>12,000</u>
Totals per year	<u>49,661</u>	<u>39,533</u>	<u>50,462</u>
	=====	=====	=====
			139,656
			-----

NOTE: Benefits excluding Moving Expenses represent 73% of Base Salary.  
Benefits including Moving Expenses represent 120% of Base Salary.

For subsequent fiscal years the monthly estimate has been increased from \$7,000 in FY1982 to \$8,000 in FY 1983, to \$9,000 in FY1984 and \$10,000 in FY1985/86.

c) Support Personnel

Support personnel will also be hired by IICA and as the long-term personnel and the consultants will be assigned to work in one of the participating Regional Organizations or the country national institutions or coffee institutes. The support personnel financed by AID includes three agronomist technicians to be assigned at CATIE under Biology of the Rust. Monthly costs have been estimated at \$583 in FY82; \$667 in FY83 and \$750 in FY84. These costs include all the benefit costs. In addition, three local contract laboratory and field technicians have been contemplated to be assigned to under Development and Reproduction of Resistant Varieties.

A summary narrative of the major cost inputs by activity follow:

I. Biology of Rust

Greenhouse \$81,000:

It is contemplated the construction of a greenhouse measuring 24' x 100' x 8' with five partitions of 1/8" fiberglass. This cost has been estimated by the ROCAP Engineer through consultations with local construction companies and fiberglass factories.

Laboratory Equipment \$79,000

The initial purchase of equipment amounts to \$66,000 as contemplated in the list that follows in U.S. 000's. Subsequent additional purchases have been estimated at \$3,000 for each year and \$4,000 for the last one.

Incubator \$11; microscopes \$4; laminar flow hood \$1; Explosion-proof frigid lab \$1; meter balance 300 g \$2; top leading balance 1,000g \$1; Ph meters \$1; ovens, sterilizers \$1; burnstead 16" x 16" x 26" chamber \$11; airconditioners 6000 BTU \$2; water still - mega pure \$1; shaker bath with temperature control \$1; laboratory furniture and furnishings to include office equipment \$10; rotator for tissue culture; weather stations \$13; Miscellaneous lab. supplies - glass and chemicals \$6.

Amounts included above have been obtained from laboratory equipment catalogs.

## II. Control of Broca

The construction of a 24' x 50' x 8' greenhouse for \$40,000 has been contemplated to be constructed in the first year of the project. This greenhouse costs have been estimated by the ROCAP Engineer through consultation with construction companies and fiberglass factories.

A total of \$21,000 for the first year has been estimated for laboratory equipment similar to those detailed below, plus additional funds at \$2,000 per year for the subsequent years.

2 microscopes \$4; environmental chamber \$3; microscope binoculars \$2; miscellaneous lab. supplies \$6; lab. furniture and refrigerators \$6.

## III. Residue Analysis

A total \$116,000 has been budgeted throughout the project to pay for the residue analysis to be done at ICAITI. These costs were calculated as follows:

1st year	200 samples	x \$33 for	\$ 6,600
2nd year	1200 samples	x \$35 for	\$42,000
3rd year	1200 samples	x \$37 for	\$44,400
4th year	600 samples	x \$39 for	<u>\$23,400</u>

\$116,400

## IV. Development and Reproduction of Resistant Varieties

One greenhouse 24' x 100' x 8' for \$80,000 has been contemplated for construction in the second year of the project. This estimate as the other greenhouses represent ROCAP's Engineer computations and consultations through local construction companies and fiberglass factories.

Progeny testing at VICOSA, Brazil and CIFC, Portugal, have been estimated at \$217,000 life of project. These estimates represent amounts provided by VICOSA and CIFC to PROMECAFE for contemplated tests under this project.

Short-term training at both leading centers has been contemplated as one of the important project activities. A total of \$132,000 has been estimated for this purpose as follows:

Two persons in training during six months of the year, one at VICOSA and one at CIFC. During this training a monthly per diem and tuition allowance of \$500 per month has been contemplated with salaries being contributed by the employer.

First year 4 people x \$500 a month x 6 months	\$24,000
Four round trips at \$1,500	<u>6,000</u>
	\$30,000

Subsequent years contemplate an increase to \$32,000, \$34,000 and \$36,000 to cover increases either in per diem and tuition or cost of transportation.

A total of \$170,000 has been estimated over the life of the project for Laboratory Equipment and Materials for Tissue Culture, the construction of the Laboratory Facilities for Tissue Culture and renovation of the required "Beneficio" for seed reproduction. These estimates have been prepared by CATIE and reasonably represent their requirements.

#### Counterpart Cost Narrative

Major cost element contributions by the regional organizations represent their own estimates. Most of the salaries are based on actual figures. The budget prepared breaks down these costs in fine detail, therefore no additional legend is presented here. National Technician costs were computed on an average for the region as follows:

	Cost by Months			
	<u>Year 2</u>	<u>3</u>	<u>4 and</u>	<u>5</u>
1 Agronomist	\$1,000	\$1,050	\$1,103	\$1,158
1 Agronomist Technician	500	525	551	580
1 Laborer	300	315	331	348

Travel and Per diem \$50 x man months of the Agronomist and Agronomist Technician.

Transportation based on estimated vehicles required by countries and \$100 per month vehicle.

Administrative Support equals 10% of personnel costs.

Timetable of Major pre-Implementation and Implementation Events

<u>Event</u>	<u>Date</u>
- AID/W Grant Authorization	4/81
- Agreements with CATIE, OIRSA finalized	5/81
- Agreements with C.A. countries finalized	5/81
- Agreements with U. of Vicosa, CIFC and ICAITI finalized	6/81
- Grant Agreement signed	6/81
- Procurement of local materials for greenhouses begun	6/81
- Procurement of lab and field equipment, vehicles, and other U.S. commodities begun	6/81
- CP's met	7/81
- Selection of L.T. and S.T. technical assistance begun	7/81
- Quarterly report due from PROMECAFE	9/81
- Annual workplans and budgets submitted to ROCAP for approval	9/81
- Arrival of L.T. Plant Pathologist for Biology of the Rust activity	10/81 - 12/81
- Arrival of L.T. Entomologist for Control of Broca activity	10/81 - 12/81
- Arrival of L.T. Plant Breeder/Pathologist for Development and Reproduction of Resistant varieties activity	10/81 - 12/81
- Arrival of Rural Sociologist for Development/Adaption of Appropriate Technology activity	10/81 - 12/81
- Arrival of Extension/Communications Specialist in Honduras	10/81 - 12/81

- Quarterly report due from PROMECAFE 12/81
- Construction of greenhouses completed;  
vehicle, laboratory equipment and  
other commodities arrive 10/81 - 12/81
- Regional Institutions Evaluative Meetings  
begin 11/81 (every  
6 mos.)
- Arrival of S.T. Pesticide Registration  
specialist for Residue Analysis  
activity 2/82
- Arrival of S.T. Epidemiologist, and S.T.  
specialist in Biological control of  
Coffee Pests for Biology of Rust and  
Control of Broca activities 3/82
- Quarterly report due from PROMECAFE 3/82
- Submission of first samples to ICAITI for  
Residue Analysis begun 4/82
- First two of twelve national technicians  
complete 6 month training at U. of  
Vicosa, Brazil and CIFC, Portugal.  
Second two depart 6/82
- First group of seeds from selected plants  
(250) complete testing by both U. of  
Vicosa and CIFC 6/82
- Quarterly report due from PROMECAFE 6/82
- First set short courses (1-2 weeks) given  
to national technicians by T.A.  
specialists in all activities 7/82 - 8/82
- Quarterly report due from PROMECAFE 9/82
- Annual workplans and budgets submitted  
to ROCAP for approval 9/82
- Completion of testing of methodologies under  
Dev./Adaption of Appropriate Technology  
in Honduras, in conjunction with IHCAFE/  
USAID Honduras 11/82
- Quarterly report due from PROMECAFE 12/82

- Second couple of 12 national technicians complete 6 months in Brazil and Portugal and second group of seeds complete testing 12/82
- Technification methodologies begin testing in 1-2 other C.A. countries 1/83
- Second set of short courses given to national technicians by T.A. specialists in all activities 1/83 - 2/83
- Quarterly report due from PROMECAFE 3/83
- Third couple of 12 national technicians complete 6 months training in Brazil and Portugal and third group of seeds complete testing 6/83
- Specialists complete a report of "Short Time Frame" activities: Epidemiology of the Rust, Control of Broca, Efficacy of Copper based fungicides 6/83
- Quarterly report due from PROMECAFE 6/83
- Mid Project Evaluation 8/83
- Third set of short courses given to national technicians by T.A. specialists in all activities 8/83
- Quarterly report due from PROMECAFE 9/83
- Annual workplans and budgets submitted to ROCAP for approval 9/83
- Fourth couple of 12 national technicians complete training in Brazil and Portugal and fourth group of seeds complete testing 12/83
- Quarterly report due from PROMECAFE 12/83
- Fourth set of short courses given to national technicians by T.A. specialists 2/84
- Quarterly report due from PROMECAFE 3/84

- Specialists reports on status of "Medium Time-Frame" activities: Efficacy of systemic fungicides, Pesticide tolerance and residue analysis for new pesticides and technification methodologies 4/84
- Quarterly report due from PROMECAFE 6/84
- Fifth couple of 12 national technicians complete training in Brazil and Portugal, and fifth group of seeds complete testing 6/84
- OIRSA makes recommendation to C.A. countries for standardization of pesticide use 6/84
- Fifth set of short courses given to national technicians by T.A. specialists 8/84
- Quarterly report due from PROMECAFE 9/84
- Annual workplans and budgets submitted to ROCAP for approval 9/84
- Sixth couple of 12 national technicians complete training in Brazil and Portugal and sixth group of seeds complete testing 12/84
- T.A. specialists report on status of "Long Time Frame", development and reproduction of resistant varieties 12/84
- Quarterly report due from PROMECAFE 12/84
- Extension/communication specialist makes evaluation and recommendations for continuing extension programs in each country 2/85 - 3/86
- Quarterly report due from PROMECAFE 3/85
- Quarterly report due from PROMECAFE 6/85
- Quarterly report due from PROMECAFE 9/85
- Annual workplans and budgets submitted to ROCAP for approval 9/85
- Quarterly report due from PROMECAFE 12/85

- Final Evaluation of project including recommendations for continuance of project by regional institutions

3/86

Illustrative List of Equipment and Cost Estimates

	<u>QTY</u>	<u>Cost U.S.</u>
A. <u>Biology of Rust</u>		
Microscopes	3	6,000
Laminar flow hood	1	1,000
Refrigerator (explosion proof)	1	1,400
Balance (300 gm)	1	2,000
Balance (top loading 1000 gm)	1	1,000
pH meters	3	1,000
Ovens	1	500
Sterilizers	1	500
Burnstead chamber	1	11,000
Waterstill - Mega pure	1	1,000
Air conditioner	2	1,200
Shaker bath, controlled temp.	1	1,000
Lab furnishings	-	4,000
Office equipment	-	3,000
Culture rotator	1	1,000
Weather instruments	6	12,000
Lab glassware, supplies	-	5,000
Sprayers	6	3,800
Field supplies/equipment		6,000
B. <u>Control of Broca</u>		
Microscopes (Stereo)	2	4,000
Microscopes (Binocular)	1	2,000
Environmental chamber	1	3,000
Refrigerator	1	800
Lab supplies - glass, chemicals	-	4,000
Field equipment	-	7,000
C. <u>Development/Reproduction Resistant Varieties</u>		
Microscope (Stereo - research)	1	3,000
Microscope (Binocular)	1	2,000
Cell Shaker	1	1,000
Rotator	1	500
Tissue grinder	1	500
Meter balance (100 gm)	1	2,000
Autoclave (electric)	1	8,000
Misc. supplies	-	10,000

## STATE OF THE ART OF COFFEE RUST AND BROCA CONTROL

The discovery of coffee rust was made more than a century ago in Sri Lanka. Since then it has spread to the Western Hemisphere and in 1976 was found in Nicaragua. The disease is now in Guatemala, Honduras, El Salvador, and Nicaragua. Because of its recent arrival, there has been little regional country specific research on Coffee Rust. In 1955 a world-wide varietal collection of coffee was begun in Costa Rica. This collection contains about 550 varieties. They have been screened for yield and adaptability, but none have been screened for Coffee Rust in Central America. Ninety of these varieties of the type Catimor (Timor x Caturra) have been sent to the University of Vicosa, for rust screening. Some of these Catimor varieties are in their F6 progeny in CICF in Portugal. These types seem to be very promising for Central America.

The life cycle of the Coffee Rust, Hemileia vastatrix is known as is the epidemiology. This project will do country and region specific research on coffee rust as it is related to the environment and varieties found in Central America. There are 32 races of coffee rust world wide. Portugal's CICF has the complete collection of races to test on new varieties. In Brazil there are only five races present and so far in Central America there are only two. When a new variety is screened, it is grown from seed and testing will require up to a year. A variety already in existence will only take two weeks to screen for rust resistance. So far in Central America there has been no rust screen or formal evaluation of some Catimor varieties released to national institutions. The results that have come from CICF and University of Vicosa so far have not been entered into a computer data bank.

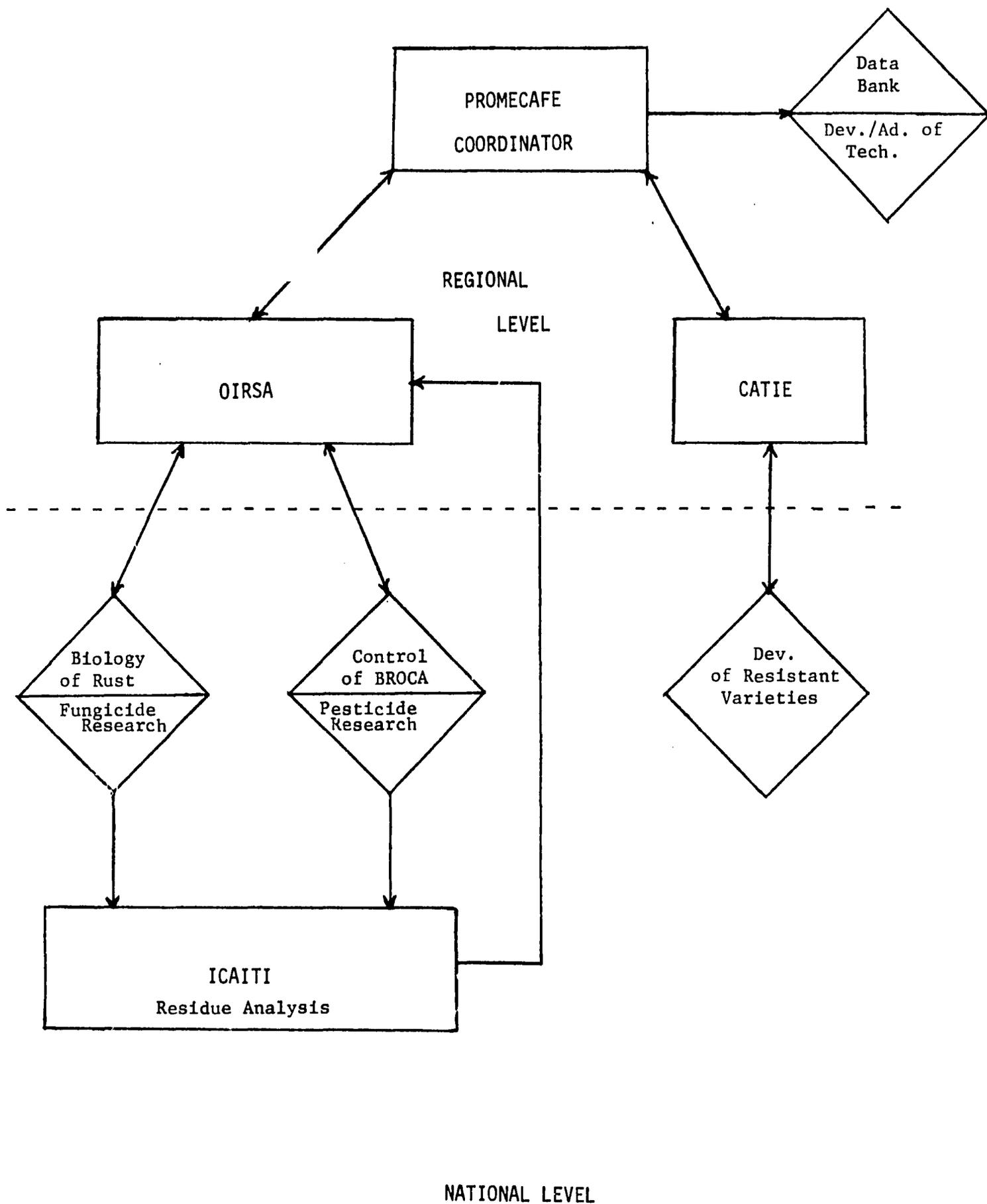
The current control measures to combat coffee rust are the sequential applications of copper based fungicide. These are approved by E.P.A. Copper based fungicides act as a protectant. This means for good control the coffee leaf has to be covered both top and bottom. In the event of a rain, the fungicide will wash off and a new application will have to be made. After two years of use these fungicides are known to be 95% effective when applied properly. Formulation research needs to be done so that a better "sticking agent" can be found to reduce the wash off effect after a rain. Also research on methods of application are required so that the underside of the leaf can be more effectively covered. The fungicides are first applied when there are signs of rust infection.

Applications are made periodically afterwards to control the rust. The timing and number will depend on rainfall and the severity of the rust attack. The cost of spraying and technification can be absorbed and profits increased by increasing coffee yields through technification by three to four times present levels. Some of the large coffee growers have been using plant systemic fungicides. It is not known whether these are effective, but it is known that E.P.A. does not approve the use of any coffee systemic pesticide.

In regard to "technification" which means optimum cultural practices, fertilizer, and density of plants per acre for high yields, these parameters are known. There is a need to put together extension packages which will be site specific as to altitude, rainfall, and soil type.

Broca is the name given to the coffee bean borer, Hypothenemus hampei. Its life cycle is known. This knowledge can be useful in its control. For example, the egg and larvae are found in the coffee bean. After harvest if there is a thorough effort to remove all fallen coffee beans from the ground, this sanitation effort will help control the borer. There does exist a natural control of broca which is a fungus that attacks the borer. More region specific studies need to be done on broca, especially the effect on the beneficial fungus that kills the broca when a fungicide is used to control coffee rust. So far, there has been little pesticide testing for efficacy of broca control.

FLOW CHART OF PROJECT ACTIVITIES



Summary: PROMECAFE is the coordinator of the project. It will be directly involved in developing the Information Network and Data Bank and in the development Adaptation of Appropriate Technologies for the small coffee farmer. The Biology of Rust and Control of Broca activities which will incorporate efficacy and residue studies will be managed by OIRSA. Research in resistant varieties will be conducted at CATIE. All of these activities will be replicated at the National level. For detailed descriptions, see the Project Description.