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

REGIONAL DEVELOPMENT OFFICE/CARIBBEAN

PROJECT PAPER

AGRICULTURAL RESEARCH AND EXTENSION

AID/LAC/P-493

Project Number: 538-0164

UNCLASSIFIED

PROJECT DATA SHEET

1. TRANSACTION CODE

A = Add
 C = Change
 D = Delete

Amendment Number

DOCUMENT CODE
3

2. COUNTRY/ENTITY

Regional Development Office/Caribbean

4. BUREAU/OFFICE

Latin America/Caribbean

05

3. PROJECT NUMBER

538-0164

5. PROJECT TITLE (maximum 40 characters)

Agricultural Research and Extension

6. PROJECT ASSISTANCE COMPLETION DATE (FACD)

MM DD YY
01 31 94

7. ESTIMATED DATE OF OBLIGATION
(Under "E" below, enter 1, 2, 3, or 4)

A. Initial FY 89 B. Quarter 2 C. Final FY 94

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

A. FUNDING SOURCE	FIRST FY 89			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total						
(Grant)	(200.0)	(1,100.0)	(1,360.0)	(623.7)	(4,376.3)	(5,000.0)
(Loan)	()	()	()	()	()	()
Other U.S.	1.					
	2.					3,965.0
Host Country	CARDI/UWI					1,110.0
Other Donor(s)	OECS					10,075.0
TOTALS						

9. SCHEDULE OF AID FUNDING (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) ARDN	120	C80		-	-	1,300	-	5,000	-
(2)									
(3)									
(4)									
TOTALS									

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

012 070

11. SECONDARY PURPOSE CODE

110

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

A. Code RIAG TECH
B. Amount 3,000 3,000

13. PROJECT PURPOSE (maximum 480 characters)

To strengthen the institutional capability of national extension services and regional research and extension organizations to generate, adapt and disseminate continuing streams of improved agricultural technologies for the benefit of farmers of the region.

14. SCHEDULED EVALUATIONS

Interim MM YY MM YY Final MM YY
06 91 09 93

15. SOURCE/ORIGIN OF GOODS AND SERVICES

000 941 Local Other (Specify)

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

Approval of Methods of Implementation/Finance

Thomas Fallon
Thomas Fallon, Controller

17. APPROVED BY

Signature *James S. Holtaway*
Title Director

Date Signed MM DD YY
03 28 94

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

MM DD YY

PROJECT AUTHORIZATION

Name of Entity: Caribbean Agricultural Research and
Development Institute
Name of Project: Agriculture Research and Extension
Project
Number of Project: 538-0164

1. Pursuant to Section 103 of the Foreign Assistance Act of 1961 as amended, I hereby authorize the Agriculture Research and Extension Project for the Caribbean Agricultural Research and Development Institute (CARDI) involving planned obligations of not to exceed Five Million Dollars (\$5,000,000) in grant funds 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. The planned life of the project is five years from the date of initial obligation.

2. The Project consists of assistance to strengthen the institutional capability of national extension services and regional research and extension organizations to generate, develop, and disseminate continuing streams of improved agricultural technologies which are responsive to the needs of participating countries and are widely adopted at the farm level.

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

a. Source and Origin of Commodities, Nationality of Services.

Commodities financed by AID under the Project shall have their source and origin in the United States or in the member countries of CARDI, except for the procurement of communications support equipment and one tractor, which shall be eligible under AID source and origin Geographic Code 935 (Free World), and except as AID may otherwise agree in writing. Except for ocean shipping, and except for the supply of four right-hand drive vehicles, communications support equipment and one tractor, which shall be eligible under AID source and origin Geographic Code 935 (Free World), the suppliers of commodities or services shall have the United States or the member countries of CARDI as their place of nationality, except as AID may otherwise agree in writing.

P

Ocean shipping financed by AID under the Project shall, except as AID may otherwise agree in writing, be financed only on flag vessels of the United States.

b. Conditions Precedent to Disbursement

1. Initial Disbursement

Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of Documentation pursuant to which disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(a) An opinion of counsel acceptable to A.I.D. that this Agreement has been duly authorized and/or ratified by, and executed on behalf of, the Grantee, and that it constitutes a valid and legally binding obligation of the Grantee in accordance with all of its terms.

(b) A statement of the name of the person holding or acting in the office of the Grantee specified in Section 8.2., and of any additional representatives, together with a specimen signature of each person specified in such statement.

(c) Evidence that a Project Manager, acceptable to USAID and UWI, has been designated with appropriate delegations of authority to effectively manage implementation of the Project.

(d) The names, qualifications and job descriptions for all professional personnel funded under the Project.

(e) A Project Sub-agreement, between CARDI and the University of the West Indies (UWI), as described in Annex I for the purpose of defining the functions and budget allocations under the Grant for each institution.

(f) Evidence that the Project has the support of OECS Governments.

2. Disbursement for Expenses other than Personnel and Financial Management Staff.

Prior to disbursement under the Grant for activities other than personnel and financial management staff or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee will, except as the

may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.

(a) Evidence of the establishment of a Project Management Committee, comprised of CARDI's Executive Director (or nominee), the Dean, Faculty of Agriculture, UWI (or nominee); the Head of the Department of Extension, UWI; the Deputy Executive Director (Development), CARDI; and the Project Manager.

(b) Evidence of the establishment and organization of a Project Country Team within each participating OECS country, to be comprised of the CARDI country representative or designee, the UWI extension specialist, and the principal extension officer or designee of the Ministry of Agriculture, with the head of the Team being the CARDI representative in each respective country who will have project organizational and reporting responsibilities directly to the Project Manager.

(c) Evidence that the CARDATs program has been fully integrated into the organizational structure and operation of CARDI.

(d) Evidence that a suitable accounting system is in place to handle Project funds;

(e) A first year workplan for each component of the Project. The workplan should contain a detailed implementation plan, staffing arrangements, specifications for equipment, operating and research expenses, and budget, including CARDI, UWI and OECS host government contributions. The plan will show the rational allocation of Project resources among the Participating OECS countries.

(f) Evidence that CARDI is receiving, on a timely basis, adequate core funding from member countries.

(g) Evidence that CARDI is actively seeking other donor support for activities relating to accomplishment of the objectives of this Project.

3. Disbursement for Construction/Renovation Activities.

Prior to disbursement under the Grant for activities involving the construction/renovation of project research and extension facilities, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the

writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.

(a) Evidence that CARDI has thoroughly assessed the potential environmental impact of any construction activities planned under the project, and that AID has approved these activities in accordance with U.S. environmental rules and regulations.

(b) Evidence that the OECS countries or CARDI obtained title to the land on which construction will be financed with Project funds.

c. Covenants

The Grantee shall covenant substantially as follows:

(1) to establish an evaluation program which will be included during the implementation of the Project and at one or more points thereafter:

(a) evaluation of progress toward attainment of the objectives of the Project;

(b) identification and evaluation of problem areas or constraints which may inhibit such attainment;

(c) assessment of how such information may be used to help overcome such problems; and

(d) evaluation, to the degree feasible, of the overall development impact of the Project.

(2) that prior to initiation of the procurement of any pesticide to be financed under the Project, to inform A.I.D. in writing of the proposed procurement and use of the pesticide, including a detailed description of how the pesticide will be used and the safeguards to be followed, and shall obtain written approval of A.I.D. prior to initiation of procurement procedures of the pesticides.

(3) that in carrying out Project activities under this Agreement to avoid (a) projects or activities which would cause or threaten substantial injury to the production, marketing, or pricing of United States agricultural commodities or products for export and (b) projects or activities involving production, processing or marketing of sugar, palm oil or citrus for export.

[Handwritten mark]

(4) that it will provide adequate staff to work with all technical specialists under the Project.

(5) to make available, on a timely basis, its local currency contribution as specified in Annex I to the Agreement

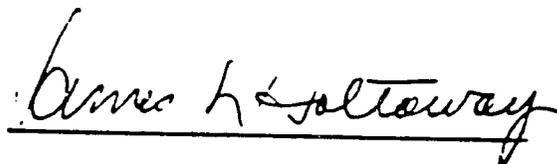
(6) to seek and to continue to receive adequate core funding.

(7) that per diem expenses to be reimbursed or paid under the Grant shall not exceed those which AID pays to its employees pursuant to its established regulations.

(8) to make best efforts to complete the functional integration of research and extension activities on a country by country basis by the end of the Project.

(9) to place high priority on incorporation of women as beneficiaries in the integrated research and extension activities of the Project.

(10) Subsequent to the first year of the Project, to submit to AID in form or substance satisfactory to AID, yearly work plans detailing activities to be completed for the subsequent twelve month period.



James S. Holtaway
Mission Director

Date: March 28, 1987

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AUTHORIZATION
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LIST OF ABBREVIATIONS AND ACRONYMS

AGFUN	-	Agricultural Gulf Fund for the United Nations.
BDD	-	British Development Division.
CAEP	-	Caribbean Agricultural Extension Project.
CAFRA	-	Caribbean Feminist Research Association.
CARDATS	-	Caribbean Agricultural Rural Development Advisory and Training Service.
CARICOM	-	Caribbean Community.
CARDI	-	Caribbean Agricultural Research and Development Institute.
CATIE	-	Tropical Agricultural Research and Training Center.
CFNI	-	Caribbean Food and Nutrition Institute.
CGIAR	-	Consultative Group on International Agricultural Research.
CIDA	-	Canadian International Development Agency.
CIMMYT	-	International Center for Improvement of Maize and Wheat Production.
CIP	-	International Potato Center.
CNIRD	-	Caribbean Network for Integrated Rural Development.
CRSP	-	Collaborative Research Support Program (USAID).
EDF	-	European Development Fund.
EEC	-	European Economic Community.
FAO	-	Food and Agriculture Organizations.
FSR/D	-	Farming Systems Research and Development Project.
GDP	-	Gross Domestic Product.

- HIAMP - High Impact Agricultural, Marketing and Production Project.
- IARC - International Agricultural Research Center.
- IDB - Inter-American Development Bank.
- IDRC - Canadian International Development Research Center.
- IFAD - International Fund for Agricultural Development.
- IICA - Inter-American Institute for Agricultural Cooperation.
- INIBAP - International Institute for Bananas and Plantains.
- IRRI - International Rice Research Institute.
- MUCIA - Mid-west Universities Consortium for International Activities.
- NES - National Extension Service.
- OECS - Organization of Eastern Caribbean States.
- RAECC - Regional Agricultural Extension Coordinating Committee.
- RDO/C - Regional Development Office/Caribbean (USAID).
- RECU - Regional Extension Communications Unit of the University of the West Indies.
- RDSS - Regional Development Strategy Statement.
- SECID - South-east Consortium for International Development.
- TROPRO - West Indies Tropical Produce Support Project.
- UNDP - United Nations Development Program.
- UWI - University of the West Indies.
- WAND - Women and Development Unit for the University of the West Indies.
- WID - Women in Development.
- WINBAN - Windward Islands Banana Grower's Association.

I. SUMMARY PROJECT DESCRIPTION

A. Executive Summary

The agriculture sector of the Eastern Caribbean island states is vital to the region's economic and employment prospects. Agriculture is, and must continue to be, important as a source of food, a generator of employment and income, and an earner and saver of foreign exchange. If the OECS' agriculture sector is to maintain its competitive advantage within the domestic market, as well as in world markets, then increases in the productivity of existing commodities, and the introduction of new, diversified commodities, must come about in response to current and future market forces.

Adaptive research and corresponding extension services are essential to development and application of improved technologies which provide higher-yielding, pest resistant crop varieties, and more efficient production practices which can be transferred to farmers. In these areas, the USAID RDO/C Mission supported past initiatives of the Caribbean Agriculture Research and Development Institute (CARDI) under the Farming Systems Research and Development Project (FSR/D); and CAEP I and II projects through the Department of Extension of the Faculty of Agriculture of the University of the West Indies (UWI). These projects laid the groundwork for what is now believed to be a unique opportunity for CARDI, UWI and national level extension services to provide easily adapted on-farm-level-benefits of improved agricultural technologies.

CARDI is in the process of implementing a new five year plan for Eastern Caribbean countries. The plan will combine the efforts of the UWI Department of Extension and the OECS national level extension services to develop and apply diversified crop technologies and extension services for the benefit of farmers. The institutional capabilities of CARDI were recently strengthened through its association with, and support from, collaborative research networks and other international agricultural research and assistance organizations. In addition, CARDI's core budget was recently fortified with additional support pledged from the advanced developing countries.

Joint planning sessions developed under previous projects allowed Agriculture Ministry officials and other policy-makers to become more attuned to constraints and to be more actively involved as participants to resolve constraints to increased productivity in the Eastern Caribbean region.

The Agriculture Research and Extension Project (AREP) is a \$10.075 million project, of which USAID RDO/C will provide a \$5 million grant over a five year life-of-project. The overall goal of the project is to improve productive efficiency of the agricultural sectors in the OECS countries to: maintain, and to the extent possible, raise incomes and food consumption of the rural poor; stabilize foreign exchange earnings/savings from agriculture; and maintain and enhance the natural resource base. The attainment of this long-term goal will be based on accomplishment of the project's purpose, which is to strengthen the institutional capability of national extension services and regional research and extension organizations to generate, adapt, and disseminate continuing streams of improved agricultural technologies for the benefit of farmers of the region.

The project will employ a well coordinated and technically reinforced farming systems methodology and farm/home management approach, for developing and applying diversified crop technologies and extension services. Project funds will support key technical and administrative staff for support to research and extension activities in the OECS countries; research and training facilities; research and extension equipment, supplies, and other expenses. The project will also provide for the costs of regional travel, workshops, training sessions and meetings, as well as technical collaboration with U.S. universities, international agricultural research centers (IARCs), UWI, and other key research and extension organizations in this hemisphere.

B. Summary Budget

(US \$000)

	<u>AID</u>	<u>CARDI</u>	<u>U.W.I.</u>	<u>OECS</u>	<u>TOTAL</u>
Technical & Support Staff	1,734.3	1,850.0	1,200.0	500.0	5,274.3
Research/Training Center	250.0	0.0	0.0	200.0	450.0
Equipment and Supplies	413.5	175.0	100.0	0.0	688.5
Research and Extension Expenses	359.3	200.0	50.0	0.0	609.3
Staff Travel	581.0	180.0	10.0	10.0	781.0
Training/Meetings	746.5	0.0	0.0	0.0	1,346.5
Technical Collaboration	450.4	0.0	0.0	0.0	450.4
Overhead	165.0	0.0	0.0	0.0	165.0
Contingency	200.0	0.0	0.0	0.0	200.0
Evaluations/Fin. Review	100.0	0.0	0.0	0.0	100.0
	<hr/> 5,000.0	<hr/> 2,505.0	<hr/> 1,460.0	<hr/> 1,110.0	<hr/> 10,075.0

II. BACKGROUND AND RATIONALE

A. Regional Setting -- Agriculture in the Eastern Caribbean:

Improving the performance of the agricultural sector is extremely important to increasing economic growth in the OECS region. The OECS countries have been successful in establishing a pattern of economic growth in the 1980s. Growth has been significant. While the rest of Latin America and the Caribbean experienced aggregate real GDP growth of 0.8 percent per year during the 1980-85 period, the corresponding figure for the OECS states was 4.2 percent. Growth has generally been continuous; with declines coming only as a result of poor sugar prices (St. Kitts), a hurricane (Dominica), and political instability (Grenada). Growth has also been export-led. The decline in the value of the U.S. currency also provided a recent boost to island prosperity, particularly for the Windward Islands exporting bananas to the U.K.

Agriculture has been one of the two leading sectors, with the other being tourism, in which agriculture made a significant indirect contribution. Excluding government, agriculture is the largest economic sector in each of the OECS countries, except for Antigua, where tourism dominates. Agriculture's share of GDP in 1985 was 14.4 percent for all the OECS states, and 18.8 percent for the four Windward Islands of Dominica, St. Lucia, St. Vincent and Grenada (Table 1). When the role of agro-industry and agricultural marketing is taken into account, those shares rise to 22.0 percent and 27.1 percent, respectively (table 2). Moreover a third of the labor force (up to 44 percent in St. Lucia) is employed in agriculture in the OECS countries.

Agriculture's importance as an earner of foreign exchange has been even greater than its contribution to GDP and employment. In 1986, agriculture accounted for 75.6 percent of the value of all domestic exports of foods (excluding re-exports) and 32.9 percent of all foreign exchange earnings (table 3). Excluding Antigua, the latter figure rises to 47.5 percent.

During the period 1965 and 1983, OECS' agricultural exports increased from \$22.5 million to \$87.9 million,

TABLE 1
COUNTRY DATA AND AGRICULTURE SHARE OF GDP

	Antigua and Barbuda	Belize	Dominica	Grenada	Montserrat	St. Christopher-Nevis	St. Lucia	St. Vincent and the Grenadines	
1981	1981	1978	1974	^a	1983	1979	1979		Year of independence
170	8,867	290	133	40	103	238	150		Total land area (square miles)
25%	4%	26%	47%	15%	42%	33%	56%		Percent land under cultivation and in pastures
80,500	166,400	77,400	96,000	12,000	47,000	137,600	105,000		Population
9% ^e	29%	13%	29%	15% ^c	51% ^e	44% ^d	29%		Percent labor force involved in agriculture
5% ^b	21%	30%	21%	5%	20%	14%	13%		Agriculture's share of gross domestic product

Source of data (except for Montserrat). 1986 *Britannica Book of the Year*. Data for Montserrat provided by Montserrat Department of Agriculture. All numbers and percentages have been rounded off to the nearest whole number.

^aIncludes portion of labor force, economy from fishing.

^bMontserrat is a colony of Great Britain.

^cIncludes persons working in forestry, fishing.

^dIncludes persons working in mining.

TABLE 2
AGRICULTURAL AND TOTAL GDP, 1985, IN OECS STATES
(in million EC\$)

	<u>Population</u>	<u>Total GDP</u>	<u>Agric. GDP</u>	<u>Agric. Divided by GDP</u>	<u>GDP Per Cap (US\$)</u>	
				(a)	(b)	
GRENADA	100,341	260.4	42.5	16.3	22.9	961
ST. VINCENT	110,192	239.1	45.9	19.2	28.9	804
ST. LUCIA	136,952	388.8	58.3	15.0	23.3	1051
DOMINICA	84,249	221.3	62.4	28.2	36.6	973
WINDWARDS	431,734	1109.7	209.1	18.8	27.1	952
ST. KITTS	43,665	166.1	17.0	10.2	19.3	1409
ANTIGUA	80,927	457.4	23.2	5.1	10.5	2095
LEEWARDS	124,592	623.5	40.2	6.5	12.8	1855
TOTAL	556,326	1733.2	249.3	14.4	22.0	1154

NOTES:

- (1) Population is end of year, except for St.Lucia, which is mid-year.
- (2) For the agricultural share of total GDP:
(a) the ratio refers to primary agric., livestock and fishing;
(b) the ratio includes 60.1% of manufacturing, plus a share of wholesale and retail trade which is proportionate to the ratio [Ag. + (.60)(mfg) divided by GDP]. This represents a conservative estimate of the share of economic activity directly linked to agriculture. The total share including indirect effects would be about 1.7 times the figure in column (a), in general, although it could be higher in some cases. (A factor of 50% of manufacturing value added is used in the Leewards).
- (3) GDP is at factor cost, not at market prices.

TABLE 3

FOREIGN EXCHANGE EARNINGS FROM
TOURISM AND AGRICULTURE, 1985
(Million US\$)

	<u>Tourism</u>						<u>Net Agriculture - Tourism (b)</u>
	<u>Gross</u>	<u>Net</u>			<u>Agriculture</u>		
		(a)	(b)	(c)	<u>Gross</u>	<u>Net</u>	
Grenada	24.4	6.1	8.1	9.8	8.1	7.3	0.90
St. Vincent	17.5	4.4	5.8	7.0	39.8	35.8	6.17
St. Lucia	44.3	11.1	14.8	17.7	31.5	28.4	1.92
Dominica	<u>9.8</u>	<u>2.5</u>	<u>3.3</u>	<u>3.9</u>	<u>13.4</u>	<u>12.1</u>	<u>3.67</u>
Windwards	96.0	24.1	32.0	38.4	92.8	83.6	2.61
St. Kitts	20.1	5.0	6.7	8.0	7.3	6.6	0.99
Antigua	<u>134.4</u>	<u>33.6</u>	<u>44.8</u>	<u>53.8</u>	<u>0.5</u>	<u>0.45</u>	<u>0.01</u>
Leewards	154.5	38.6	51.5	61.8	7.8	7.05	0.14
Total	250.5	62.7	83.5	100.2	100.6	90.7	1.09
(Total w/o Antigua)	(116.1)	29.1	38.7	46.4	100.1	90.2	2.33

Assumptions in the net/gross rates for tourism earnings:

- (a) 25% (75% leakages to imports)
- (b) 33% (67% leakage to imports); preferred assumption)
- (c) 40% (60% leakage to imports)

reflecting a healthy average annual growth rate of 7.9 percent. In recent years, exports grew even more rapidly. From 1982 to 1986, agricultural exports expanded at an annual rate of 19.0 percent. In per-capita terms, agricultural export levels in the Eastern Caribbean are among the world's highest, with the OECS exporting annually more than \$200 per-capita of agricultural products.

In gross terms, tourism earns more foreign exchange for the islands than agriculture. However, the picture is different in net terms, due to foreign exchange leakages going toward imported inputs. The region is a high food importer --- the extra-regional food import bill for 1987 was EC\$1.9 billion, with the majority being livestock products (EC \$765 million), cereals and legumes (EC \$580 million), and fruits and vegetables (EC \$187 million).

Under commonly accepted assumptions about the ratio of imported inputs in both agriculture and tourism (Table 4), however, agriculture is a larger net earner of foreign exchange, and is much larger when Antigua is excluded. Table 4 shows the important role of tourism in the economies of the islands, but they also suggest that the islands are equally dependent on agriculture as a primary means to achieving sustained economic growth.

The region relies heavily on a few categories of commodities for export. Traditional agricultural export commodities, largely bananas, sugar and sugar products, and spices, account for a significant part (approximately 90 percent) of total exports of OECS countries. The OECS is a relatively high-cost producer of bananas and sugar. By 1992, with the expected parity in the European Common Market, the OECS may lose its favored import status for bananas in the UK. An additional negative factor is the world sugar market, which currently is depressed and has little near-term prospect for recovery. Thus, the OECS will have to remain highly competitive to even retain its present share of the markets. Exports of non-traditional crops are increasing, but both volume and value are still relatively low. In addition, agricultural export earnings have not kept pace with the demand for food imported from extra-regional sources, resulting in a negative food balance of EC \$1.0 billion, which represents over 50 percent of the total current account deficit.

B. Opportunities for Growth in Agriculture

At this point in time, with pressure on all its traditional markets, the OECS agricultural strategy must achieve steady and sustained growth over the longer term. This strategy will first require maintaining an economically sound position in existing markets (e.g. intraregional food crops, bananas, cocoa, nutmeg) through increased productivity and improved quality. It also requires careful selection of a few non-traditional crops with characteristics that allow for competitive production and marketing by Eastern Caribbean countries. Importantly, the OECS agricultural strategy needs to be market-driven. Experience shows that product quality, price, demand and other market forces are best to determine the direction of research and medium-to-long-term agricultural planning in the region.

Much more of the domestically consumed food, and a growing amount of food used to meet demands of the burgeoning tourist industry, can be produced within the OECS. Crop-level studies indicate that, in spite of current, generally unfavorable macroeconomic environments, some comparative advantages exist in a range of products, including traditional exports (spices from Grenada, essential oils, copra, possibly cocoa), traditional foods for export (chiefly root crops and some vegetables), non-traditional exports (breadfruit, mango, avocado, guava, citrus, passion fruit, sapodilla, soursop, papaya, cashews, golden apple, and carambola come out strongly in different studies), and some import substitutes (possibly peppers, pumpkins, green beans, cucumbers and cabbage).

Markets of sugar, bananas, spices, coconuts (copra), and cocoa are already fairly well known. Yet markets for ethnic commodities, off-season fruits and vegetables, and exotics are largely unexplored. The OECS countries have some comparative advantage supplying sizeable West Indian ethnic markets in the U.K., Canada, and the U.S. with yams, dasheens, eddoes, sweet potatoes, breadfruit, and plantain and a mixture of tropical fruits, hot peppers, and spices. The total market is estimated to amount to about 4,000 tons, maximum, with some of the market being

TABLE 4
OECS FOREIGN TRADE, 1986
(million EC\$)

	<u>TOTAL</u> <u>EXPORTS</u> <u>GDS/NFS</u>	<u>DOMESTIC</u> <u>EXPORTS</u> <u>GOODS</u>	<u>AGRICUL-</u> <u>TURAL</u>	<u>BANANAS</u>	<u>SUGAR</u>	<u>OTHER</u>	<u>MANUFAC-</u> <u>TURED</u>	<u>OTHER</u> <u>DOMESTIC</u> <u>EXPORTS</u>	<u>RE-</u> <u>EXPORTS</u>	<u>TOURISM</u> <u>RECEIPTS</u>	<u>IMPORTS</u>	<u>EXPORTS</u> <u>LESS</u> <u>IMPORTS</u>
ANTIGUA	461	25	2	0	0	2	17	6	28	409	560	(99)
DOMINICA	145	105	79	68	0	11	4	22	12	28	151	(5)
GRENADA	150	71	68	13	0	55	2	1	6	72	225	(76)
ST. KITTS	140	64	27	0	25	1	36	1	7	69	174	(34)
ST. LUCIA	367	213	167	142	0	25	44	3	11	143	418	(51)
ST. VINCENT	<u>224</u>	<u>170</u>	<u>148</u>	<u>53</u>	<u>0</u>	<u>95</u>	<u>20</u>	<u>2</u>	<u>3</u>	<u>52</u>	<u>236</u>	<u>(11)</u>
OECS	<u>1,488</u>	<u>648</u>	<u>490</u>	<u>277</u>	<u>25</u>	<u>188</u>	<u>123</u>	<u>34</u>	<u>67</u>	<u>773</u>	<u>1,764</u>	<u>(276)</u>

Source: OECS Statistics.

supplied by other Caribbean countries. Any near-term growth in this market, however, may be offset by declining preferences of subsequent generations.

The OECS countries can participate, at less of an advantage than the crops mentioned above, in off-season fruit and vegetable markets of the U.K., Canada, and the U.S. This is a demanding and risky market, but large and growing. The small quantities which the OECS countries can produce should be readily absorbed during the market windows when prices are high.

The Windwards produce a large variety of exotic fruits and flowers (e.g., mangos, papayas, passion fruit, antherium, orchids), demand for which is growing in the U.K., Canada, and the U.S. The size of this market and its growth rate are not clearly known. The family relationships among emigres to these countries may facilitate OECS market penetration in the same way the ethnic West Indian market was penetrated.

The most promising possibilities for import substitution in livestock may be by increasing production of small ruminants (sheep and goats) in the Windwards and for beef production in the Leewards, grown on native pasture and fed with domestic byproducts. In the latter case, field studies show that the main barrier to livestock production is a lack of dry season forage, but alternatives do exist that warrant field trial. Maize has been successful in Antigua at the field level. Sorghum may be viable in the Leewards. Legume trees and cassava are known options that are adaptable to OECS climates. Fish and fish meal present other options as does chopped cane (currently used in Trinidad on a commercial scale). For beef production, the main bottleneck appears to be a lack of entrepreneurial willingness or initial capital. Dairy farming is limited, but may have some potential in small-scale operations on Dominica.

In pursuing opportunities, a distinction can be made between opportunities in the two Leeward Islands, Antigua and St. Kitts/Nevis, and the four Windward Islands, Dominica, St. Lucia, St. Vincent, and Grenada. Differences in terrain, rainfall, wage levels, and other factors led to sharply different crop mixes. In the Leewards, sugar and molasses, and to a lesser extent, cotton and coconuts, are leading agricultural products, but agriculture is struggling there. Antigua is the only OECS country to have experienced a drop in agricultural

exports in the last twenty years. In the Windwards, bananas are dominant, followed by root crops (yams, dasheens, tannias), cocoa, copra, plantains, citrus, and a wide variety of other crops. In the OECS only two of the Windwards (Grenada and St. Vincent) are free of the fruit fly.

The Leewards now are net importers of agricultural products and the Windwards are net exporters. A part of the non-banana exports of the Windwards goes to supply the hotel trade in the Leewards, especially from Dominica, but also from St. Lucia and to a lesser extent to other Windwards.

These and other differences in the structures of the economies have been reflected in labor markets. The Leewards are experiencing labor shortages while the Windwards still generally have labor surpluses. (There is significant on-going net out-migration from all the islands, so that population growth rates are very low.) In St. Kitts, the labor shortage is making it increasingly difficult to sustain the sugarcane harvest at levels sufficient for an economically efficient amount of throughput in the sugar milling process, while in Antigua, the labor shortage resulted in wage rates that are about 40 percent higher than the average for the Windwards.

A market-led approach can have very positive implications for commodity groups in the two major island groupings. In the Leewards, emphasis is on fruits and vegetables for tourist trade, some livestock (especially sheep and goats) raised on native forages and byproducts for import substitution, and perhaps selected traditional (spices or cotton) and non-traditional exports. Due to shortages and variability of rainfall, any significant programs of crop production would likely have to be done under supplemental irrigation which would introduce added costs (which might be offset by higher production). High wage rates will also limit opportunities in the Leewards, especially in Antigua.

In the Windwards, emphasis will be on a wider range of food crops for the domestic market, both for local consumption and tourism, traditional exports, and, in particular, non-traditional exports, with small ruminant livestock production integrated within the crop production.

C. The Problem

Productivity of most crops is low in absolute terms compared to commercial producers in other countries, the best producers in the region, and ongoing supervised field trials. Low productivity raises unit costs and reduces competitiveness of OECS products. All major commodity groups, except vegetables, recorded lower production growth rates during the period 1980-84 compared to the earlier period 1975-79. Low productivity is largely the result of inadequate attention to technology generation, transfer and adoption. The problem is acute, not only for marketed commodities, but also for subsistence crops and for resource management since farmed land is already used intensively. In addition, agricultural land is generally steep, and any intensive use without conservation techniques leads to erosion, water runoff, and siltation, degrading both the land and surrounding waters on which the fishing and tourist industries depend.

A considerable amount of research is currently available or in process for non-traditional import substitution and export crops and related products which are adaptable to the Eastern Caribbean, yet much remains to be done, particularly in terms of on-farm testing and the transference of information and skills to the farmer. The linkages between research and extension practices must be strong for the proper selection of crop varieties needed for seasonal production, pest disease resistance and control, and improved fertilizer and environmental practices. Some crops such as tomatoes, onions and white potatoes are being imported to the E.C. for both local consumption and in response to increasing demand from tourists. Research shows these crops can be grown on most of the Eastern Caribbean islands and are, in fact, currently being produced on a limited scale in Dominica, Montserrat and St. Lucia. Production is expected to expand to St. Kitts, but production information and extension skills need to be developed and applied at the farm level to enable this to come about.

For the E.C. intra-regional market to expand into bona fide extra-regional markets for non-traditional crops, including such products as papaya, mango, passion fruit and avocado, the quality of these products must be

improved through research and farm trials, and better practices must be used by the farmer in post-harvest handling and storage.

Research and extension must also be capable of having an impact on other key aspects of production and marketing. Pests and diseases are constantly adapting to natural tolerance or resistance bred in varieties, and to chemical or biological means of control. New means of pest and disease management must be discovered through research trials and in some cases more advanced tissue culture practices. In a country such as the U.S., it is estimated that as much as ninety percent of research expenditures are allocated for this type of maintenance research. Other research must be directed at learning appropriate agronomic practices, e.g., plant density, cultivation practices, fertilizer and moisture amounts and timing, if farmers can expect to achieve an increase in yields and incomes. Research, as applied through extension services, can also be effective in identifying farming systems which employ combinations of crops and animals to optimize farm household income, within the constraints and limitations of a small farm community.

Moreover, research must be developed which focuses more on income opportunities for women in agriculture, as demonstrated on a small scale under the AID-funded FSR/D program. Data indicate that women will continue to play an active role in Eastern Caribbean agriculture both as producers and family providers. On-farm production practices, guided by project developed research and implemented with extension service assistance, must be attuned to the potential micro-enterprise opportunities involving agriculture processing and marketing, in which women have shown a predominance in the region.

Increasing productivity in agriculture can have a deleterious impact on the environment through misuse and abuse of pesticides and fertilizers, and a lack of regard for watershed management and the conservation of other natural resources. In line with this, research and extension methods must be wisely employed in the identification of sustainable agricultural systems which not only increase production, but at the same time serve to sustain and enhance the natural resource base.

Another problem with developing better quality research and information which can be readily adopted by farmers, has been the absence of strong linkages (prior to the FSR/D project) with international research organizations. These institutions have available a wealth of information and research findings which have been tested under varying conditions in other parts of the world. The International Agricultural Research Centers (IARCs) are resources which can now be easily drawn upon by CARDI and UWI to support agricultural productivity research. The International Center for the Improvement of Maize and Wheat Production (CIMMYT) in Mexico and the International Rice Research Institute (IRRI) in the Philippines, are part of the system of IARCs which cover most of the major food commodities, food policy, and national agricultural research system management, and extend over most of the regions of the developing world. In addition, the stability of international support to the IARCs is assured through the multi-donor Consultative Group on International Agricultural Research (CGIAR). Several international agricultural research centers, such as the International Institute for Bananas and Plantains (INIBAP), which is of particular usefulness given the current and projected downward trend in the E.C. banana export industry.

Regional research centers such as CATIE in Central America adapt varieties and practices to particular agro-climatic environments, as well as carry out special programs in resource management. National Agricultural Research Systems (NARSs) of the developing world are linked to the IARCs and regional research centers through a series of research networks. This system provides a powerful new source of constantly improving germplasm for the OECS, of which the AREP project will take full advantage.

Experience has shown that improved technology alone cannot do the entire job of agricultural development. A range of institutional and policy support mechanisms must be in place if agriculture is to develop and benefits are to be spread widely among the farm population. Although most of the OECS countries have agricultural research departments within the Agriculture Ministries, few of the staff are qualified academically to perform research. None of the OECS countries has the resources to support an agricultural research system to respond to all of its

needs, particularly in the area of well-qualified personnel. Staff of the Faculty of Agriculture of the University of the West Indies (UWI) are engaged primarily in teaching; in part due to shortages of funds. They are not heavily involved in research, and the research that is being carried out is applied primarily to Trinidad. Moreover, since the commercial market is small and spread over many commodities, incentives for private sector research are minimal.

D. Project Setting -- Past Experience: Agricultural Research and Extension in the OECS.

1. Research

The Caribbean Agricultural Research and Development Institute (CARDI) evolution over its relatively short life can be divided into three phases. During the establishment phase (1975-78), the Institute concentrated on maintaining the high quality of adaptive research capacity it inherited from its predecessor. The main research activities were then carried out at CARDI headquarters in Trinidad with small units in Jamaica and Barbados.

The decentralization phase (1979-86) involved steady growth to meet a wider range of problems from member countries and an increased emphasis on small farmers and domestic crops. During this phase, CARDI established an active research program with scientists working in all member states, and with the help of external funding (primarily from USAID), embarked on a major program using the farming systems methodology.

The current phase is one of consolidation of existing programs and diversification into non-traditional export crops to more effectively address the needs of OECS member states. This stage involves identifying and overcoming weaknesses in the Institution, better focusing the research efforts to achieve greater impact, and establishing linkages with other institutions to strengthen the region's capacity to carry out quality research.

USAID has provided previous support to CARDI in the Small Farm Multiple Cropping Systems Project (1978-83), and the

CARDI Farming Systems Research and Development Project, a \$7.55 million effort which began implementation in July 1983 and is scheduled to terminate March 31, 1989. These projects were designed to develop an effective and sustainable Farming Systems Research and Development (FSR/D) program in CARDI that is responsive to agricultural needs in Eastern Caribbean countries. In addition to adapting a methodology suitable to Eastern Caribbean conditions, this support helped build a cadre of trained staff and developed several improved technologies which were adopted at the farm level. These technologies include: propagation of yams using "mini-sets"; evaluation and release of white and sweet potato varieties; initiation of IPM controls for cabbage insect problems; adaptation and demonstration of top-working of mangoes for export markets; and distribution to farmers of improved planting materials for grains and rootcrops. The project also established a very important linkage between CARDI and the South East Consortium for International Development (SECID) through the technical assistance which SECID provided to improve research methodology, personnel management and computerization.

Other advantages derived from previous project support for CARDI are the potential linkages which can now be made with other ongoing projects in support of the development of non-traditional agricultural exports. The HIAMP and TROPRO projects will be able to effectively complement CARDI's research program in diversified agricultural production. Foreign market analysis and other export oriented services will benefit small farmers and farmer associations participating directly or indirectly in the project.

CARDI has now developed an initial, reliable and consistent source of research and information on most traditional crops, as well as on a variety of non-traditional and import substitution crops which are potentially adaptable to the region's agronomic conditions. Given the cumulative effect of previous project interventions, it can now be said that CARDI is poised to more aggressively implement a longer term strategy -- one that is carried out in conjunction with the combined resources and expertise of UWI, OECS national level planning and extension service personnel, and with

the support of an international network of agricultural research organizations to bring about sustained agricultural and economic growth in the region.

2. Extension

National agricultural extension services, on the other hand, are operating in each of the OECS countries. Ten years ago, analyses indicated numerous deficiencies that needed to be overcome if the extension services were to be effective in making agriculture more productive and efficient. These analyses most importantly indicated that:

- o Organization and management of extension programs were characterized by poorly defined goals, conflicting lines of authority, insufficient incentives, and unreliable monitoring of educational programs.
- o Extension field staff lacked adequate training in general agriculture, small farm cropping techniques, and extension delivery methods.
- o The national extension systems had few established methods for accurately assessing farmers' needs.
- o Extension delivery systems were not organized to reach farmers effectively, and field staff lacked the equipment they needed to function effectively.
- o Links between the Ministries of Agriculture and CARDI and other entities that conduct research in the region were weak and unsystematic.
- o Front-line extension officers lacked a clear understanding of what they were supposed to do and had no work plans or detailed job descriptions to guide them.

USAID has provided support since 1980 to OECS National Extension Services through the Department of Extension, Faculty of Agriculture, University of the West Indies, under the Caribbean Agricultural Extension Projects (CAEP). Phase II of this project is a US\$10.144 million effort which began implementation in January 1983, to improve the effectiveness of both national extension

systems and selected regional institutions in order to provide the small farm family with the necessary information and technology to increase the value of agricultural production and employment. It is scheduled to terminate June 30, 1989.

CAEP has had three phases of development. During the first phase (1980-82), institutional analyses were carried out on the agencies and organizations which had an impact on national extension systems in the OECS (and Belize). The analyses identified weaknesses and strengths of the extension systems and provided profiles of the levels of skills and training, administrative and supervisory procedures, communication resources, and technical backstopping available to the national extension systems. National extension improvement plans were designed to overcome constraints and broaden the outreach so that the extension systems could make more efficient use of resources, whether human or otherwise, for a more effective impact at the farm level.

During the second phase (1982-85), improvement plans were implemented with particular reference to structural re-organization, role specification, and motivation; training and professional development, both formal and informal; communication resources for mobility and information dissemination; and UWI backstopping.

During the third phase (1985-present), the "farm/home management approach"* was initiated based on a farming systems perspective. Selected extension districts were chosen to demonstrate how an effective and efficient extension system can operate at the district level without extra inputs. This is accomplished by utilizing an optimum resource management approach. Rapid reconnaissance surveys (sondeos) in each district were also conducted by multidisciplinary teams, composed of professionals from OECS Ministries of Agriculture, CARDI, CARDATS, CFNI, MUCIA universities, and UWI faculty of agriculture (including CAEP) staff.

* See technical annex for detailed description of farm/home management approach.

CAEP has served to reorganize and reorient the extension programs of the various OECS countries. These major improvements have included a profit analysis system introduced into farm management; at UWI a Regional Extension Communications Unit was established, which is producing high quality audio visual materials for OECS extension services; and 20 participants from OECS countries were trained at the UWI Extension Diploma level, in addition to providing much additional training through regular short courses. Through the CAEP Project, a very productive relationship has developed between the UWI Department of Extension and the Mid West Consortium for International Activities (MUCIA) as a result of the technical assistance provided by MUCIA in the areas of extension methodology, communications and farm management. As a result of the CAEP Project, a consensus has developed about what extension should be. In line with this, staff are now being professionalized and are relatively well-prepared to plan and execute work programs. A recent USAID evaluation concluded that as a result of the project, "the island extension services have been largely transformed from their previous unfocused, ineffective state into well-organized, potentially highly effective systems." The Department of Extension, Faculty of Agriculture, University of the West Indies, can thus provide the most effective means of professionalizing national extension systems in the OECS.

E. Project Rationale

Past experience in agriculture research and extension programs and recent agriculture sector assessments have pointed to three, continuing major constraints to increasing agriculture productivity and sustaining agricultural growth, which will be addressed under the project. These constraints are: 1) the need for more diversified agricultural commodities that are adaptable to the Eastern Caribbean region, (both the OECS and CARDI view this as a priority area in agricultural research); 2) the need for stronger linkages between agricultural research and extension services, most notably in the area of national level extension service capabilities and the motivational level of extension agents in carrying out their functions; and 3) the lack of good quality data and

analysis capabilities for the transference of technology and application of extension services at the on-farm level.

The AREP project proposes to address these constraints through a process which builds upon the ongoing research and extension work of CARDI and UWI, and at the same time incorporates, through a more effective methodology, the individual country, national level agricultural planning and extension programs, and draws upon the support of the collaborative research networks and other international resources for the benefit of farmers of the Eastern Caribbean.

In essence, the project will bring to bear both technical and human resources to achieve the following three end-of-project objectives:

1. CARDI is producing a continuing stream of improved, adaptive technologies over a diversified range of commodities, which have been directly adopted by approximately 10% of the farm population of the Eastern Caribbean states and which are reducing production costs by 5% in import substitution crops, 2% in non-traditional export crops, and 5% in traditional export crops*. (See economic analysis Annex E for additional details).

2. UWI is working effectively with CARDI and the respective OECS Ministries of Agriculture in strengthening and improving the service delivery mechanisms and capabilities of agricultural extension agents in the region for the benefit of small farmers.

3. A collaborative approach to the development and implementation of adaptive research and extension services in the Eastern Caribbean has been institutionalized within CARDI, UWI and the Ministries of Agriculture. The approach will include regular joint planning sessions, data gathering and analysis assignments, and the incorporation of other technical collaborative research and extension networks for strengthening and sustaining the project's ongoing activities for the benefit of small farmers.

Cost reductions will be greatest in the seventh year after initiation of the project.

F. Relationship to Agency Policies and Strategies, Recipient Strategies, Other RDO/C Projects, and Other Donor Support.

1. Relationship to the Action Plan and RDSS

RDO/C development goals for the Caribbean region, as stated in the Annual Action Plan FY 89-90, are: (1) to promote economic growth as measured by significant improvement in gross national product and employment (GDP), led by export earnings; (2) to strengthen free political institutions and environments in which private economies flourish; (3) to foster economic self-reliance; and (4) to support regional institutions when they help achieve the first three objectives.

RDO/C's Action Plan strategy, directed primarily towards the six Eastern Caribbean LDCs, supports restructuring of the economic environment to better promote export-led and employment-generating private sector growth. RDO/C programs will focus resources and policy dialogue on three productive sectors with the most promise for growth, one of which is agriculture, particularly to develop, produce, and export increasing quantities of diversified agricultural commodities for commercial markets.

Growth in agriculture has been constrained by the continued reliance on a few traditional export crops which have experienced declining or uncertain world markets. The strategy is to diversify into other high value, high quality agricultural products with potential for income, export, and employment growth. A second constraint has been the small farmers' inadequate knowledge and experience with modern agricultural methods. RDO/C's strategy is to support efforts: ... to test and adapt production practices to the circumstances of the Eastern Caribbean;

The Regional Development Strategy Statement (RDSS) identifies agriculture as one of the most promising sectors. However, in the RDSS, in addition to the objective mentioned above, agricultural diversification as a means to retain tourist industry revenue will be emphasized.

The proposed project will contribute to development and production of increasing quantities of diversified

agricultural commodities for export and for efficient import substitution. It will contribute to increased domestic production and employment, led by export earnings and by retention of a greater percentage of tourism industry revenue. It will strengthen the role of the largest private sector group in the Eastern Caribbean, farmers. And it will utilize a regional institution to achieve these objectives.

The project is consistent with the USAID RDO/C Agricultural Sector Strategy, 1990-1994 (December 1, 1988), from which main points are integrated into the attached Technical Annex. In particular, the strategy concludes that in the OECS context, agricultural development should have four basic elements, one of which is "(iv) Product development programs, including agricultural research and extension" The strategy goes on to state: "To break the long-standing dichotomy between island plantations and subsistence farmers the RDO/C agricultural strategy will support programs dedicated to streamlining production and marketing activities of farmers and exporters. ... RDO/C will concentrate on improving efficiency in farming, especially of non-traditional crops."

The project is consistent with Recommendations for Supporting Agricultural Research Institution-Building in Latin America and the Caribbean (Division of Agriculture and Rural Development, Bureau for Latin America and the Caribbean, AID, 1987). These recommendations are 1) improve external linkages, 2) support government research programs, 3) improve educational programs and, 4) collaborate with the private sector.

Lastly, the project is consistent with the AID Administrator's Policy Guidance on agricultural extension which encourages USAIDs to consider supporting selective interventions to strengthen public sector extension systems, mass media communications, and private sector extension efforts.

2. Conformity with Recipient Strategy

The meeting of the Heads of Government of the OECS held in St. Lucia on March 1-2, 1988, concluded that agricultural diversification should be initiated or intensified on the basis of real market opportunities which can be

effectively realized. The meeting concluded that there should be (1) an intensification of production of those short and medium-term crops with good market prospects, and (2) a program of applied agronomic research into high-priced crops or other non-traditional agricultural enterprises with good market prospects. One of the key elements required for success in the diversification effort will be the degree of competitiveness of the products in the marketplace. Competitiveness can be enhanced by use of appropriate improved technologies that will increase yield levels and, at the same time, reduce unit costs of production. It was intimated that new institutions should not be created unnecessarily to do the job, but rather that existing institutions should either be modified or strengthened and integrated.

3. Relationship to Other RDO/C Projects

The project is an integral part of the RDO/C strategy to address the constraints of technology adaptation and transfer, credit, marketing and infrastructure, involved in regional diversification to high value, high quality, non-traditional agricultural exports. Other projects involved in this strategy are the High Impact Agricultural Marketing and Production Project (HIAMP) which is addressing marketing and credit constraints and the West Indies Tropical Produce Support Project (TROPRO) which will deal with marketing and infrastructure. The purpose of the on-going HIAMP Project is to increase the contribution of the agricultural sector and agricultural enterprises to GDP by improving the investment environment, relieving development constraints to private capital inflows, and demonstrating attractive returns on capital at acceptable levels of investor risk. RDO/C is designing the TROPRO Project to conduct critical foreign market analysis and to provide follow-up operational support to align the various production and marketing inputs to meet foreign demand.

4. Relation to Other Donor Support

Other donor support to CARDI is detailed in Annex J. A summary of donor support to CARDI by crop and country location is also provided in Table 5. CARDI donors meet once a year to coordinate support and to discuss CARDI

progress and needs in order to avoid duplication and to maximize results. Other donor projects at the present time are:

EDF: Under LOME II, EDF supported CARDI programs in pasture agronomy, soil and water conservation and aroid cultivation. EDF is currently discussing a LOME III agreement with CARDI with program areas and funding levels yet to be decided.

BDD: The British Development Division is concentrating on tree crops of coffee, fruit and spices. The BDD has just signed an agreement for a new 5-year \$1.1 million project aimed at supporting CARDI's diversification efforts in pest control, agronomy, varietal evaluation of mango, grapefruit, avocado, passion fruit and soursop.

FAO: FAO plays an instrumental role in bringing CARDI and potential donors together and provides support in the area of technical cooperation.

CIDA: Current Canadian International Development Assistance involves small projects in dairy, integrated pest management and mangoes.

IDRC: The International Development Research Center is assisting CARDI to develop farming systems information services.

UNDP: UNDP is the sole donor to CARDATS.

Other donors which are considering support to CARDI include the Italian Government in seed production, the Arabian Gulf States Fund (AGFUN) in post-harvest handling and storage, Inter-American Development Bank (IDB) on research networking, the International Fund for Agricultural Development (IFAD) on sheep and goat production systems, and Barclays Bank Development Fund on seed production of peanut, pigeon pea, pepper, tannia and yam.

III. PROJECT DESCRIPTION

A. Project Goal and Purpose

The Goal of the Agricultural Research and Extension Project AREP is to improve productive efficiency of the agricultural sectors in the OECS countries in order to:

- o Maintain, and to the extent possible raise, incomes and food consumption of the rural poor.
- o Stabilize foreign exchange earnings/savings from agriculture.
- o Maintain and enhance the natural resource base.

The purpose of the Project is to strengthen the institutional capability of national extension services and regional research and extension organizations to generate, adapt, and disseminate continuing streams of improved agricultural technologies for the benefit of farmers of the region.

B. Project Strategy

The project will consist of three components: technology adaptation, extension services, and research/extension linkages. The project will continue to strengthen the capabilities of CARDI and UWI to carry out activities started in earlier projects, i.e., to conduct effective farming systems research and to support and backstop the national extension systems. It will also strengthen linkages between research and extension to facilitate two-way flow of information to more effectively develop and transfer information about improved technologies that are developed for adoption by farmers.

1. Technology Adaptation

CARDI will develop and adapt improved technologies for diversified agriculture with an emphasis on non-traditional export commodities, through country programs which employ a farming systems methodology and are supported by commodity-oriented collaborative research networks.

CARDI will focus its programs on a few key commodities in respective OECS countries. The general CARDI commodity focus has been identified in the Caribbean Agricultural Research and Development Institute (CARDI) Strategic Plan 1988/93 (June 1988). The priority commodities addressed in this particular project will be identified based on considerations of interests expressed by the respective countries, market potential, and the technical feasibility of production. The initial identification of commodities for OECS countries (Table 5) consists of 1) import substitution crops including tomato, onion, cabbage and Irish potato; 2) traditional export crops of cocoa and nutmeg and 3) the non-traditional export crops of sweet potato, yams, aroids, hot pepper, ginger, cucurbics, plantain, papaya, breadfruit, pineapple, soursop, passion fruit, avocado and mango (a more detailed list of priority research areas is included in the Technical Analysis). As noted in the project's Technical and Economic Analyses, pest management forms a major part of the research priorities for most crops to be supported under this project. CARDI's pest management philosophy is to emphasize integrated programs * in which the use of chemicals is minimized. (Note: the Technical Analysis also includes a discussion of pesticide control in OECS countries).

The primary focus will be on non-traditional export commodities. The priority commodities will be reviewed annually in CARDI's regular planning schedule cycle.

Country-level problems and constraints will be identified utilizing a farming systems methodology developed by Ministry of Agriculture, CARDI and UWI staff.** This will be done initially and periodically thereafter to help

* For a discussion of Integrated Pest Management (IPM) please see the Technical Analysis, Annex E

** For a discussion of farming systems methodology see CARDI: Farming Systems Research and Development (538-0099) Project Paper.

TABLE 5

CARDI RESEARCH PRIORITIES

	<u>St.Kitts</u>	<u>Antigua</u>	<u>Mont.</u>	<u>Dominica</u>	<u>St.Lucia</u>	<u>St.Vincent</u>	<u>Grenada</u>	<u>Source of Germplasm</u>
<u>Local Market</u>								
White potato	x		x					CIP
Cabbage	x	x	x					AVRDC
Onion	x		x					Private sources
Tomato	x	x	x					AVRDC, Israel
<u>Traditional Exports</u>								
Citrus				x				
Cocoa							x	IICA/CATIE Network
Nutmeg							x	
<u>Non-traditional Exports</u>								
Sweet potato	x	x	x		x	x		CIP, UNI, Clemson
Yams					x			IITA, Clemson
Eddoe						x		INRA
Tannia				EDF*				
Dasheen				EDF*				
Hot pepper	x	x	x			x	x	
Ginger					x	x		
Cucubics		x						
Plantain				x	x	x		FHIA (Honduras)
Papaya		x			x		x	
Breadfruit	x		x		x		x	
Pineapple					x		x	
Soursop				BDD*			x	
Passion fruit	x	x	x	BDD*		x		
Avocado				BDD*				
Mango	x		x	BDD*		x	x	
Grapefruit				BDD*				
<u>Import Substitute</u>								
Mutton	IFAD*	IFAD*		EDF*	CIDA*	CARDATS*		Small Ruminant CRSP
Goats	IFAD*	IFAD*		EDF*	CIDA*	CARDATS*		Small Ruminant CRSP
Dairy				EDF*				
<u>Centers of Excellence</u>		forages		hard fruits aroids	soft fruits yams	sweet potato	nutmeg cocoa	

* Crops and locations of principal other donor support.

establish alternative technologies and production systems, along with target groups of farmers. This information will be fed back into the crop and animal programs to ensure that the technologies developed in multi-country collaborative research networks (including international agricultural research centers and other sources of technology) are relevant to and adaptable by the farmer. Integration of technologies within production systems ensures that technologies developed through component research are related to the agro-socio-economic parameters of the production system. Integrated production systems for priority commodities and areas will then be tested on selected experiment stations and validated on target farms. CARDI Technology Adaptation Specialists, at least one of which will be located in each OECS country, will play a key role in Farming Systems problem identification and resolution. The system will include an identification of key problems through initial reconnaissance surveys (sondoes) by teams of researchers and extensionists; on-station research to assess available technology; the design and testing of new innovations to solve remaining problems; on-farm testing of alternative innovations by researchers with the involvement of extensionists and farmers; validation of technologies by researchers, extensionists and farmers on a greater number of farms and under specific agronomic conditions; and demonstrations on farmers' fields to further adjust the technology and disseminate improved technologies to other farmers.

In the data gathering and analysis process, emphasis will be given to gender-related constraints/opportunities, and the data and findings will be disaggregated accordingly and acted upon through a series of highly-focused, on-farm activities.

Research to identify and adapt improved commodities suitable to the OECS agroclimatic and socio-economic environments will be carried out by CARDI-coordinated multi-country collaborative research networks. The networks will be supported through strong linkages with international agricultural research centers (IARCs) and other sources of technology such as Collaborative Research Support Programs (CRSPs) and private sector investor research. The collaborative research networks will follow generally accepted operating procedures. Key to this is a Steering Committee composed of participating scientists which will provide technical leadership, and through

regular meetings of participating scientists to identify goals, review results to date, prioritize technical problems, and identify and allocate tasks among participants. The AREP project will be a funder of four collaborative networks: root crops, fruits, vegetables, and farming systems. Financial support for collaborative research networks will also come from the CARDI core budget or other sources of external assistance, most likely through an anticipated IDB networking project. The project-funded Technology Adaptation Specialist staff will be active participants in the networks, particularly in testing the commodities in systems in the participating countries, and in transferring this information to extensionists, farmers, farm groups etc., in a useable form and providing feedback to researchers on the appropriateness of the technology and other related matters.

Institutional strengthening achievements/accomplishments of the project related to the Research Component, will include the following:

- o CARDI is carrying out effective technology adaptation at the farm level in coordination and consultation with National Extension Services, which is resulting in improved technologies that are readily transferred by the national extension systems.
- o CARDI is implementing multi-country collaborative research networks (including participation of the relevant IARCs and other sources of improved germplasm) in several of the commodities of major emphasis in the region.
- o CARDI is core-funding all of its Technology Adaptation Specialists.
- o The OECS countries are providing adequate policy and funding support to CARDI (in line with their planned contributions as detailed in Annex J) and the UWI extension outreach program.
- o The CARDI donor support group is meeting regularly at both the regional (OECS) and Washington/CGIAR levels, and effectively serving to mobilize and coordinate funding for CARDI.

- o CARDI is producing a continuing stream of improved technologies over a range of commodities that are being adopted by the project's small farmer target beneficiaries.

2. Extension Services

The UWI Department of Extension will increase the effectiveness of national and private sector extension systems by using a farm/home management approach. This approach is based on an awareness of farming systems that benefit from close interaction between research and extension at all levels.*

As the principal means of advising farmers on the implications of new farming systems (e.g., the introduction of such non-traditional export commodities passion fruit, soursop, avocado, mango and pineapple), the UWI Staff will continue to work with Ministry of Agriculture extension staff to institutionalize the farm and home management approach, and to analyze farm enterprises with emphasis on record keeping and decision-making techniques.

Extension staff capability and motivation are the essence of effective extension efforts. Training to improve extension staff will be pursued at several levels. Several senior extension staff will be selected for post-graduate degrees at UWI (perhaps with some training at cooperating U.S. universities) in topics such as crop protection (one-year post graduate course is already planned). Ten front-line extension workers with high potential to move up to senior positions will be selected for diploma programs in extension for mid-level managers at UWI. Two kinds of short courses and seminars/workshops will be sponsored to keep the extension staffs up-to-date with current methodologies and related subjects. Regional level short courses and workshops (3 to 5 days each for

* For a discussion of Extension Methodology, see the Caribbean Agricultural Extension I and Caribbean Agricultural Extension II (538-0068) Project Papers.

groups of up to 10 extensionists) will be organized on such topics as supervision, opportunities for women in marketing agricultural products, and micro-enterprise development related to crop diversification. National level workshops and seminars will be held regularly on topics such as disease control and pest management, technology adaptation for non-traditional crops, and home/farm management innovation.

Communication support systems will be designed, produced, and tested with special emphasis placed on radio and video programming. Attention to greater efficiencies and quality of information dissemination will be derived through desk-top publishing capabilities. UWI staff will work with national extension services to strengthen national communications units (e.g. radio stations) to raise the level of awareness in crop diversification. The capability of the Regional Extension Communications Unit (RECU) at UWI will be upgraded in such areas as desk-top publishing, radio and video (cassettes) to produce instructive materials and data on, among other things, reconnaissance sondeos, and pesticide application and abuse.

Special attention will be given to enhancing the professionalism of the agricultural extension staffs. UWI will continue to support the annual recognition of Excellence in Extension Award (based on a point system and peer group review) to reward outstanding national extension system staff. UWI will also promote active national associations of extension workers in the respective countries (with Dominica having the most advanced association thus far).

Institutional achievements/accomplishments of the Extension Services Component will include the following:

- o UWI is working effectively with the Ministries of Agriculture to foster well-organized and managed national extension systems which are effectively transferring improved technologies to farmers.
- o UWI is funding an Extension Specialist for the Leeward Islands (in addition to the Extension Specialist for the Windward Islands currently being funded) and an Extension Communications Coordinator from its regular core budget.

- o A cadre of National Extension Service staff will have received post graduate training and will have attended specialized workshops and training sessions related to extension work in diversified agriculture.
- o UWI project staff will have contributed significantly to the improved skills, capabilities and enhanced motivation of Agricultural Extension agents participating under the project, and their related work on 150 small farm units targetted under the project. In line with this, workshops and regional conferences will be carried out with assistance from the Women in Development Unit (WAND), (based in Barbados), the Extra-Mural Department of the University of the West Indies, and possibly the Mid-West Universities Consortium for International Agriculture/Women in Development group (MUCIA/WID), which promoted the incorporation of gender issues into the CAEP project design.

3. Research/Extension Linkage

The major new thrust of the project will be to strengthen linkages between research and extension to ensure integration at the regional, national, district, and farm levels and improve two-way communication with farmers and policy-makers. National Extension Services, CARDI and UWI will work together to promote and help carry out the majority of these activities, which will require special attention in coordinating implementation arrangements.

Several things will be done at administrative and operational levels to encourage more interaction between CARDI, UWI and National Extension Services. The AREP Project Management Committee, composed of equal representation from both CARDI and UWI, and the project manager, will meet regularly to review project policy. CARDI, and UWI and to the extent possible National Extension Service staff will be officed together in St. Lucia (Windward Islands) and Antigua (Leward Islands) research and training centers, thus facilitating communication and joint project implementation. UWI faculty, including the Ministries of Agriculture extension staff, will be active participants in the annual program planning process of CARDI, and in turn, CARDI staff will be invited to assist in drafting the annual work plans for the UWI extension activities. National Extension

Services, CARDI, and UWI will collaborate on the dissemination of research findings, (TIFs, technology information files) at the farm level: (e.g. improving quality and reducing duplication where two or more parties release information on the same topic). In other words, CARDI will have the comparative advantage in "what to say", and UWI and the National Extension Services the comparative advantage in "how to say it".

Several actions will be taken to strengthen interaction in the respective country programs. Research (CARDI) and extension staff will collaborate in rapid reconnaissance surveys (sondeos) and in on-station and on-farm validation of system technologies. Research (CARDI) and extension staff will also be encouraged to participate jointly in training activities and workshops.

UWI will use its network of extension contacts and experience to initiate several key project activities. It will take the lead in organizing quarterly meetings of farmers at district levels at which UWI and CARDI will inform and be informed about extension/research/marketing issues that are elicited from the on-farm level and from other private sector sources. UWI will also structure its farm/home management activities to focus attention on household and family issues, micro-enterprise combinations related to crop diversification, farm financial, marketing and management concepts and procedures, and farm record keeping systems which will go beyond the present CAEP demonstration districts and include collaborative programs with CARDI/CARDATS, in which districts will be defined on specific criteria including watershed and agro-ecological zones.

CARDI, UWI and National Extension Services will collaborate to institutionalize and strengthen organizations at regional and national levels in support of agricultural development. For example, the Regional Agricultural Extension Coordinating Committee (RAECC), which meets every 18 months to address extension and research matters, will be broadened to make researchers more explicit and active participants. The same concept will be tested at national and district levels.

Technology Adaptation Specialists and extension staff will involve such private sector groups as farmer associations,

fertilizer, pesticide, and seed company representatives, and marketing organizations in the technology generation and transfer system, through their attendance at workshops, planning sessions (when appropriate) and at observation visits to experiment stations and reconnaissance trips.

Technology Adaptation Specialists will provide the key linkage between research and extension. They will make sure that technology is in a form which is usable by extensionists and farmers, and will provide feedback to other researchers on the acceptability of improved technology and any other constraints requiring research and analysis.

Institutional achievements/accomplishments of the Research and Extension Linkage Component will include the following:

- o CARDI, UWI and National Extension Services are collaborating effectively, to be determined by the following actions:
 - A Project Management Committee is meeting regularly and providing effective leadership and oversight to the project.
 - CARDI, UWI and National Extension Services are collaborating on planning research and extension programs, i.e., each participates in the annual planning exercise of the other.
 - CARDI, the UWI Department of Extension and to the extent possible, National Extension Services are sharing sub-regional headquarters offices in Antigua and St. Lucia, and are taking advantage of the opportunity to communicate officially and informally in joint planning and carrying out technology adaptation and extension service activities.
 - CARDI and the UWI Department of Extension are sharing project related communications facilities, and as a result are providing improved information dissemination for all aspects of the project.

- CARDI and the National Extension Services are collaborating effectively to be determined by: 1) the degree to which Technology Adaptation Specialists are working with Extension agents; and, 2) the number of technical innovations which are received and used by farmers.
- o A Regional Agricultural Research and Extension Coordinating Committee, consisting of Chief Agricultural Officers from the Ministries of participating countries, farmers' representatives, and professionals from regional organizations such as CARDI and UWI, CFNI, CARICOM Secretariat, and the OECS Secretariat, is established and meeting regularly (at a minimum of once every 18 months), to exchange information and assist in decision-making on policies for improvement of technology generation and transfer in the Eastern Caribbean.

Performance achievements/accomplishments of the Research and Extension Component will include the following:

- o A significant percentage (10%) of the farmers in the OECS countries have adopted the recommendations generated by the research and extension efforts.

C. Project Elements

USAID is, in part, supporting the core strategy of CARDI with emphasis on country-level adaptive research toward a more diversified agriculture sector in the OECS countries. USAID is also funding selected activities of the Department of Extension of the Faculty of Agriculture of the University of the West Indies aimed at improving national extension services. USAID support for the AREP project will fund selected technical and support staff,

research and training facilities, research and extension equipment, supplies, and expenses, travel, training and workshops, and technical collaboration/consultancies.

1. Personnel

Personnel for the project will be supplied by USAID, CARDI, UWI, and Ministries of Agriculture.

USAID will fund the following:

Technology Adaptation (CARDI)

Technology Adaptation Specialist* (6 at the beginning of the project decreasing to 3 by the final year of the project).

Pomologist (5 years)

Agricultural Economist or Social Scientist (first 4 years)**

Extension Services (UWI)

Extension Specialist, Leeward Islands (first 3 years)

Communications Coordinator (first 3 years)

Farm management Specialist (first 2 years)

Support Staff (CARDI and UWI)

Administrative Officers and Assistants

Officers (1 each for 5 years for the Extension Program and for the Technology Adaptation Coordinator)

Administrative Assistants for the Technology Adaptation Specialists (7) and for Extension Services (2)

* To the extent possible OECS Ministries of Agriculture will participate in the selection of these specialists.

** It is anticipated that the social scientist will play a primary role in ensuring that gender analysis will be taken into explicit account in research and extension planning and implementation (see Social Soundness Analysis). Within the first year of the Project this individual will also develop a management information plan which will include a baseline on costs of production. During the Project he/she will assist Project Management to monitor attainment of Project objectives.

CARDI will fund the following:

- Project Manager (5 years)
- Technology Adaptation Coordinator (5 years)
- Technology Adaptation Specialists (1 at the beginning of the project increasing to 4 by the final year of the project)
- Subject Matter Specialists and Technical Support staff (part-time)
- Program Leaders (part-time)
- Senior Management (part-time)
- Country Representatives and staff (part-time)

UWI will fund the following (primarily for Extension Services):

- Extension Specialist, Windward Islands (5 years)
- Extension Specialist, Leeward Islands (final 2 years)
- Communications Coordinator (final 2 years)
- Extension and Training Program Leader (part time)
- Faculty of Agriculture Staff in Agronomy, Soil Science, Agricultural Economics, Livestock Science, etc. (part-time)

It is anticipated that other donors (BDD and EDF) will fund the following (who will contribute particularly to Technology Adaptation):

- Plant Physiologist (5 years)
- Post Harvest Technologists (perhaps 2 for 5 years each)

The Chief Extension Officer of each OECS Ministry of Agriculture (or his designee) will serve on the country team. Other extension personnel will coordinate with technology adaptation specialists and extension specialists in on-farm trials and farm and home management studies and training.

USAID recognizes the need to assist CARDI in the transition to more effective program direction and more stable funding support. However, it is exercising caution in not encouraging CARDI to overextend itself based on project or "soft" funding; consequently, CARDI and UWI are absorbing several of the key positions for core support during the life of the project. As such, this will serve as one test of the institutional strengthening objective of the project.

2. Research and Training Facilities

CARDI needs efficient, well-managed research and training facilities strategically located in the OECS to reflect the agro-climatic difference in rainfall, soils, and other growing characteristics. USAID will fund the establishment and/or upgrading of modest but suitable field research, laboratory and training facilities to enable the development and testing of technologies at three key locations:

- St. Lucia (research and extension training center, field development as a center for fruits, roots, and yams);
- Antigua (office and extension training center for vegetables); and
- St. Vincent (research and extension training center for root crops).

The BDD has agreed to provide funds for a laboratory at Dominica (fruits, arroids, tissue culture). The research and training centers at St. Lucia and Antigua will jointly office CARDI and UWI Department of Extension staff. The OECS countries will provide the land for the research and training facilities.

3. Equipment and Supplies

USAID will provide funds to CARDI for small equipment and supplies, and a limited amount of larger items such as tractors, planting and harvesting equipment, and vehicles for the St. Lucia, Antigua, and St. Vincent experiment stations (an illustrative list is contained in Annex I).

USAID will provide funds to UWI to purchase such supplies as film, video cassettes, paper, and the publication materials/supplies for fact sheets, bulletins, and radio reports. It will fund video equipment and computer hardware and software for the extension services program.

CARDI and UWI will also be providing funding for equipment and supplies, but their available resources are not sufficient to provide all that is needed. These categories are necessary for project implementation, and

are usually the first to be curtailed when operational expense funds are low; USAID funding will ensure that the operational expenses necessary to make the project work are fully covered.

4. Research and Extension Research Expenses

USAID will provide funding to CARDI for the staff expenses (2 data recorders, 4 laborers each) at the St. Lucia, Antigua, and St. Vincent experiment stations. It will fund the expenses of the farmer validation trials in the 7 participating countries (to include seeds, fertilizer, labor, signs, and other materials).

USAID will provide funds to UWI for the limited expenses required to continue farm management research on farm households, a key element of the extension services effort. The same rationale as in the previous section holds for covering these expenses.

5. Travel

USAID will provide funds to CARDI for local travel of Technology Adaptation Specialists to carry out on-farm validation trials within the participating countries.

Project funding will also provide for inter and intra-island travel for the Extension Specialists (Windward Islands and Leeward Islands), Communications Coordinator, Farm Management Specialist, Extension Coordinator, Technology Adaptation Coordinator, Pomologist, Agricultural Economist, and Project Manager (pursuing his project management functions) for the length of the project (even after the salaries for the positions are absorbed by UWI and CARDI).

In addition, USAID will provide a small amount of funds (for CARDI and UWI) for extra-regional travel throughout the life of project to reinforce linkages with the international agricultural research centers (CIAT, CIP, IITA), CATIE, CRSPs, and other sources of technology generation.

CARDI, UWI, and the OECS countries will also be providing travel from their funds for cooperating staff. Travel is often sacrificed when budgets are tight; thus, USAID

support will ensure that professional staff can get to the areas which are necessary to carry out their work.

6. Training/Workshop/Meetings

As part of the Extension Services Component, USAID will provide funds to UWI for at least 10 extension staff members from OECS countries to complete the one year Extension Diploma course at UWI. Two groups of 5 each will complete the course. Funding for this will ensure that OECS extension staff receive the benefits of this proven program. The course is scheduled on a regular basis, but the OECS will not benefit directly from it unless funding is provided.

USAID will provide (to CARDI and UWI) for post-graduate level training (the equivalent of 6 two-year degree classes) for key research or extension staff, with the possibility that some of the funding will be used for training at international agricultural research centers in topics including farm management, experiment station management, and research design. USAID will provide funds to UWI for costs (travel and per diem) of quarterly workshops for the attendance of front-line extension staff in each of the participating countries.

USAID will fund costs (travel and per diem; to CARDI and UWI) of multi-country workshops to include network meetings on the subjects of root crops, fruits, vegetables, and farming systems; research and extension program planning; extension in-service training; special topics in research and extension; management training for senior CARDI staff; expanded Regional Agricultural Extension Coordinating Committee (RAECC) meetings; and a limited amount of short-term training (IARCs, management training).

CARDI, UWI and the OECS countries will make contributions to training/workshops by paying the salaries of their staff while they receive training, and will also contribute staff participation/support as appropriate.

(Note: this and the next category of funding support are considered especially important to the institutional strengthening of CARDI, UWI, and the national agricultural and extension systems of the OECS countries, as means of bringing up-to-date ideas and techniques to the participating staff.)

7. Technical Collaboration/Consultancy

USAID will provide funds for CARDI and UWI to maintain linkages with selected U.S. institutions. It is expected that the linkages will be primarily with SECID for short-term consultancies in areas of research management and priority setting and with MUCIA for short-term consultancies in the areas of extension methodology and communications. CARDI and UWI have had previous mutually beneficial professional relationships with SECID and MUCIA respectively. It is likely that CARDI will also want to establish a relationship with a U.S. institution (probably the University of Florida) for short-term consultancies/feasibility studies on tropical fruit and vegetable production. As part of this collaboration, the U.S. institutions will be encouraged to contribute scholarships, to participate in exchange programs and to utilize Title XII strengthening grant funds to provide additional technical assistance.

USAID will provide funds (to CARDI and UWI) for consultancies by UWI staff to assist in extension training and participate in technical matters on the research and extension efforts. This is considered particularly useful in terms of fully utilizing UWI expertise, which often has limited opportunity to carry out research because of funding shortages. Consultancies to CARDI by UWI staff will also serve to bring the interests of CARDI and UWI into closer harmony by working on common problems.

IV. COST ESTIMATES AND FINANCIAL PLAN

SUMMARY FINANCIAL PLAN

The total cost of the project is \$10,075,000. AID will provide grant funds of \$5,000,000. This will finance some technical and support staff, research and training facilities, research and extension equipment, various supplies and other operational costs, travel, training and workshops and technical collaboration. Funding for technical and support staff, equipment and supplies, and other operational costs will be provided on a decreasing scale over the five year life of the project. CARDI and UWI will contribute \$2,505,000 and \$1,460,000 respectively, towards the cost of technical staff, equipment and supplies, research expenses, travel and workshops, and training. Other donors will contribute an amount of \$1,110,000 towards the financing of some technical staff, travel, workshops and training.

Summary Financial Plan
(US\$ \$000)

	<u>AID</u>	<u>CARDI</u>	<u>U.W.I.</u>	<u>OECS</u>	<u>TOTAL</u>
I. Technical and Support Staff*	1,734.3	1,850.0	1,200.0	500.0	5,274.3
II. Research/Training Center	250.0	0.0	0.0	200.0	450.0
III. Equipment and Supplies	413.5	175.0	100.0	0.0	638.5
IV. Research and Extension Expenses	359.3	200.0	50.0	0.0	609.3
V. Staff Travel	581.0	180.0	10.0	10.0	781.0
VI. Training/Meetings	746.5	100.0	100.0	400.0	1,346.5
VII. Technical Collaboration	450.4	0.0	0.0	0.0	450.4
VIII. Overhead 10% for UWI**	165.0	0.0	0.0	0.0	165.0
IX. Contingency	200.0	0.0	0.0	0.0	200.0
X. Evaluations & Fin. Review Audit	100.0	0.0	0.0	0.0	100.0
	<u>5,000.0</u>	<u>2,505.0</u>	<u>1,460.0</u>	<u>1,110.0</u>	<u>10,075.0</u>

- * An inflation factor of 4% per year has been built into salaries.
** Maximum provisional rate, subject to audit.

A. AID Financial Inputs*

1. Technical and Support Staff (\$1,734,300)

a. Extension (\$420,000)

AID grant funds will support the salaries, benefits and allowances of one Extension Specialist for the Leeward Islands, and one Communications Coordinator for the first three years of the project. In addition grant funds will be provided for one Farm Management Specialist for the first two years. Support staff will be comprised of one Administrative Officer and two Administrative Assistants which will be funded for the full five years of the project.

b. Research (\$1,314,300)

AID grant funds will finance the salaries, benefits and allowances for six Technology Adaptation Specialists for the first three years of the project. This number will be reduced to four in the fourth year and three in the fifth year. In addition funds will be provided for one Agricultural Economist and one Pomologist for the first four years of the project. Support staff will be comprised of an Administrative Officer and seven Administrative Assistants. Funding for support staff will be provided for the full five years of the project.

2. Research and Training Centers (\$250,000)

a. AID will distribute grant funds of \$150,000 towards the cost of a training and demonstration room, a greenhouse, tissue culture facilities, propagation bins, storage facilities, upgrading of offices, a field laboratory which would include post harvest packing and storage and refrigeration rooms. Also included in the above figure are funds for initial farm development which would involve fencing, drainage and infrastructure (roads). The aforementioned facilities will be used for research on fruits, yams and other rootcrops, and will be constructed in St. Lucia during the second and third years of the project.

b. An amount of \$50,000 will also be provided for the upgrading of office facilities to include the

* Detailed Budget Tables supporting each line item are included in Annex L.

Caribbean Agricultural and Extension Project (CAEP), and a demonstration room in Antigua.

c. Also during the second and third years of the project AID will provide grant funds of \$50,000 for initial farm development which will mainly consist of fencing and drainage, a field laboratory, tissue culture facilities, office facilities and a demonstration and training room. This phase of the project will be located in St. Vincent and will be dealing mainly with root crops.

3. Equipment and Supplies (\$413,500)

a. Extension (\$228,500)

AID will provide a total of \$143,000 over the five year period towards the purchase of supplies for the extension program. \$19,000 will be provided during the first year and the balance of \$124,000 will be provided over the next four years at \$31,000 per year. These supplies will comprise of film, video cassettes, paper, publication materials/supplies for fact/sheets, bulletins and radio reports. In addition \$22,000 will be provided in the first year for a video camera and computer equipment, and \$12,000 for a motor vehicle for use by extension staff in St. Lucia. A further \$51,500 will be contributed towards the purchase of office equipment and supplies and will be spread over the five years of the project. Of this amount \$11,500 will be reserved for the first year and \$10,000 per year will be provided over the next four years.

b. Research (\$135,000)

With regard to contributions towards equipment and supplies for research AID will provide \$85,000 for this purpose over the full period of the project. \$60,000 will be provided over the first two years in equal amounts of \$30,000 per year, \$10,000 per year will be provided in the third and fourth years and \$5,000 in the fifth year. Funds for office supplies and equipment will be provided over the five year period at \$10,000 per year.

c. Vehicles (\$50,000)

Three vehicles will also be provided for use by research staff, and an amount of \$50,000 has been budgeted for this purpose. These will be located in St. Lucia, Antigua and St. Vincent.

4. Research and Extension Expenses (\$359,300)

AID grant funds will be used to fund farm development expenses totalling \$25,000 which is calculated over the five year period of the project at \$5,000 per year. In addition \$281,800 has been provided for station experiments. This will include the purchase of two recorders at \$4,500 each, and wages for five laborers and other staff expenses at each of three stations. This will be funded for the full five years and the amounts for staff expenses allow for a five percent annual increase. Finally, on-farm validation has been calculated at \$10,500 per year for the full five year period and an amount of \$52,500 has been budgeted for this purpose. This comprises fifteen farmer sites in seven countries at \$100 per site for the purchase of seeds, fertilizer, labor and signs.

5. Staff Travel (\$581,000)

a. Local Travel (\$67,500)

It is anticipated that the Technology Adaptation Specialist will do extensive local travel within the participating countries when carrying out on-farm validation trials. The budget for this has been calculated on the following basis.

- (i) Sixty miles within two countries over two hundred days.
- (ii) Thirty miles within two countries over two hundred days.
- (iii) Fifteen miles within three countries over two hundred days.

The cost per mile is estimated to be thirty cents giving totals of \$7,200, \$3,600 and \$2,700 respectively. An amount of \$67,500 has accordingly been budgeted for the five year period at \$13,500 per year.

b. Regional Travel (\$458,500) (See Annex A-9)

USAID will fund regional travel for nine professional staff over the five year life of the project. It is anticipated that forty six trips per year will be made at an average airfare of \$250 per trip. The two Extensions Specialists for the Windward and Leeward Islands are each expected to travel for seven and a half days per month for eleven months of each year. It is anticipated that the Farm Management Specialist will make six trips each year at ten days per trip, the Communications Specialist will make six trips per year at five days per trip and the Extension Coordinator and the Technology Adaptation Coordinator will each make eleven trips per year at seven and a half days per trip. It is also anticipated that the Agricultural Economist and the Pomologist will each make six trips per year at an average of five days per trip, and it is expected that the Project Manager will make six trips per year at an average of six days per trip.

c. Extra Regional Travel (\$30,000)

Grant funds will be provided for extra regional travel in order to encourage linkages with international agricultural research centers (CIAT, CIP, IITA), CATIE, CRSPs and other sources of technology generation. This is estimated to be a total of \$30,000 over the five year life of the project calculated at \$6,000 per year and has therefore been budgeted for accordingly. A per diem of \$100 per day has been incorporated in the above figures.

6. Training/Meetings (\$746,500)

a. UWI Extension Diploma Course (\$120,000)

AID will fund two one year diploma courses for ten OECS staff, the courses will be divided into two groups of five staff per group and will be held in the second and fourth year respectively.

b. Post Graduate Training (\$180,000)

AID will fund 12 person years of post graduate training at \$15,000 per year. Alternately the funds could be used for UWI one year MSc courses

specializing in crop protection, or one year courses at the International Agricultural Research Centers (IARC) or US universities.

c. Workshops, Meetings In-Country (\$42,500)

This comprises front line extension training twice each year in seven countries, and is calculated at \$8,500 per year for the full five years of the project.

d. Multi-Country Workshops (\$404,000)

These will include research and extension annual meetings, multi-country networks, extension in-service training, special topics extension training, management training for CARDI senior staff and other short term training at the International Agricultural Research Centres (IARCS).

7. Technical Collaboration (\$450,400)

AID will provide funds for technical collaboration primarily to maintain linkages with MUCIA and SECID both of which have previously had mutually beneficial relationships with CARDI and UWI.

It is estimated that the daily cost of the above will be \$500. Allowances for annual increases have been calculated at five percent.

a. Extension (\$124,300)

This is based on thirty seven days per year for five years at \$500 per day including four air trips at \$1000 per trip. The daily rate of \$500 is comprised of salary \$270, per diem \$110, and \$120 for overheads.

b. Research (\$218,300)

Grant funds will be provided for training in Research Management and related technical training. It is anticipated that this will be carried out for sixty-five days per year over the full five years of the project. It is also estimated that a total of seven air trips will be necessary for this training program.

In addition to the above AID will provide \$107,700 for extension, farm management training and research support to UWI and CARDI. This will be provided by UWI professionals outside of the Department of Extension. This support will consist of 45 days for UWI and 20 days for CARDI per year. It is anticipated that the aforementioned support will be divided in thirteen sessions of five days per session at a cost of \$250 per day. This will also include thirteen air trips at \$250 per trip. The primary purpose of this support will be to provide short-term technical assistance needed for specific studies related to non-traditional crop production.

CARDI Financial Inputs

1. Technical and Support Staff (\$1,850,000)

CARDI's contribution will comprise of a Project Manager and a Technology Adaptation Coordinator for the full five year period, and two Technology Adaptation Specialists at the beginning of the project increasing to five by the final year. CARDI will also fund part-time subject matter specialists and technical support staff, part-time Program Leaders, part-time senior management staff and part-time Country Representatives and staff.

2. Equipment and Supplies (\$175,000)

CARDI will contribute \$175,000 towards the purchase of equipment and supplies. This consists of \$100,000 for research equipment, \$25,000 for office equipment and \$50,000 for vehicles.

3. Research and Extension Expenses (\$200,000)

CARDI will contribute approximately thirty-two percent of the cost of Research and Extension expenses, consisting of \$125,000 for station experiments and \$75,000 for on-farm validation.

4. Staff Travel (\$180,000)

CARDI will provide funds for travel of cooperating staff, consisting of \$60,000 for local travel and \$120,000 for regional travel.

5. Training Workshops/Meetings (\$100,000)

CARDI will make contributions to training workshops by paying the salaries of their staff being trained and also contribute to staff participation and support as necessary.

UWI Financial Inputs

1. Technical and Support Staff (\$1,200,000)

UWI will provide funding for one Extension Specialist for the Windward Islands for the full five years of the project, and one for the Leeward Islands for two years. UWI will also fund a communications Coordinator for 2 years, and an Extension and Training Program Leader on a part-time basis. Additional part-time staff will include personnel from the department of Agronomy, Soil Science, Agricultural Economics, Livestock Science and other related subjects.

2. Other UWI Contributions (\$260,000)

UWI will contribute \$100,000 towards the purchase of Equipment and Supplies, \$50,000 towards research and extension expenses, \$10,000 towards the cost staff travel and \$100,000 toward the cost of meetings and training.

OECS Financial Inputs (\$1,110,000)

This includes a percentage of the salaries of Ministry of Agriculture personnel collaborating with the Project (\$500,000); the estimated value of offices and research facilities provided by OECS countries (\$200,00); the travel of Ministry personnel to RAECC meetings (\$10,000) and the salaries of national extension services employees while in training programs (\$400,000).

TABLE I
SUMMARY COST ESTIMATE AND FINANCIAL PLAN
(US\$ 000)

<u>AID INPUTS</u>	\$	\$
<u>I. PERSONNEL COSTS</u>		
<u>Research and Extension</u>		
Technical Specialists	1,124.2	
Administrative Officers	238.7	
Administrative Assistants	371.3	
		1,734.3
<u>II. RESEARCH AND TRAINING CENTERS</u>		
<u>Plant and Specimen Supplies</u>		
St. Lucia	150.0	
Antigua	50.0	
St. Vincent	<u>50.0</u>	
		250.0
<u>III. EQUIPMENT AND SUPPLIES</u>		
<u>Research and Extension Equipment</u>		
Extension	177.0	
Research	85.0	
<u>Office Equipment and Supplies</u>		
Extension	51.5	
Research	50.0	
Vehicles	<u>50.0</u>	
		413.5
<u>IV. RESEARCH AND EXTENSION EXPENSES</u>		
Farm Management	25.0	
Station Experiments	281.8	
On-farm Validation	<u>52.5</u>	
		359.3

<u>AID INPUTS</u>		\$	\$
<u>V. STAFF TRAVEL</u>			
Local Travel		67.5	
Regional Travel		458.5	
Extra Regional Travel		30.0	
Other Travel Project Manager		<u>25.0</u>	
			581.0
<u>VI. TRAINING/MEETINGS</u>			
UWI Extension Diploma Course		120.0	
MSc and Research courses		180.0	
In-Country meetings and workshops		42.5	
Multi-Country Networks		90.0	
In-Service and other			
Extension Training		<u>314.0</u>	
			746.5
<u>VII. TECHNICAL COLLABORATION</u>			
U.S. Institutions		342.7	
UWI		<u>107.7</u>	
			450.4
<u>VIII. Overhead*</u>			
Contingency		165.0	
Evaluation and Financial/Review/Audits		200.0	
		100.0	
			465.0
			<u>5,000.0</u>
<u>TOTAL AID INPUTS</u>			
<u>CARDI INPUTS</u>			
I. Technical and Support Staff		1850.0	
II. Equipment and Supplies		175.0	
III. Research and Extension Expenses		200.0	
IV. Training/Meetings		100.0	
V. Staff Travel		<u>180.0</u>	
			<u>2,505.0</u>
<u>UWI INPUTS</u>			
I. Technical and Support Staff		1200.0	
II. Equipment and Supplies		100.0	
III. Research and Extension Expenses		50.0	
IV. Staff Travel		10.0	
V. Training/Meetings		<u>100.0</u>	
			1,460.0

*Provisional rate of 10% on all activities implemented by UWI.

OECS DONORS

I.	Technical and Support Staff	500.0	
II.	Research and Training Center	200.0	
III.	Staff Travel	10.0	
IV.	Training/Meetings	<u>400.0</u>	
	GRAND TOTAL		<u>1,110.0</u> <u>10,075.0</u>

TABLE 2

DETAILED COST ESTIMATE AND FINANCIAL PLAN
(US\$ 000)

<u>INPUTS (ALL DONORS)</u>	<u>AID</u>	<u>CARDI</u>	<u>UWI</u>	<u>OECS</u>	<u>TOTAL</u>
<u>I. PERSONNEL COSTS</u>					
<u>Research and Extension</u>					
Technical Specialists	1,124.3	1276.0	960	500	3,860.3
Administrative, Management and Support Staff	<u>610.0</u>	<u>574.0</u>	<u>240</u>	<u>--</u>	<u>1,424.0</u>
	1,734.3	1,850.0	1,200.0	500	5,284.3
<u>II. RESEARCH AND TRAINING CENTERS</u>					
<u>Plant and Specimen Supplies</u>					
St. Lucia	150.0	--	--	100	250.0
Antigua	50.0	--	--	50	100.0
St. Vincent	<u>50.0</u>	<u>--</u>	<u>--</u>	<u>50</u>	<u>100.0</u>
	250.0	--	--	200.0	450.0
<u>III. EQUIPMENT AND SUPPLIES</u>					
<u>Research and Extension Equipment</u>					
Extension	177.0	--	30.0	--	207.0
Research	85.0	100.0	--	--	185.0
<u>Office Equipment and Supplies</u>					
Extension	51.5	--	70.0	--	121.5
Research	50.0	25.0	--	--	75.0
Vehicles	<u>50.0</u>	<u>50.0</u>	<u>--</u>	<u>--</u>	<u>100.0</u>
	413.5	175.0	100.0	--	688.5
<u>IV. RESEARCH AND EXTENSION EXPENSES</u>					
Farm Management	25.0	--	50.0	--	75.0
Station Experiments	281.8	150.0	--	--	406.8
On-farm Validation	<u>52.5</u>	<u>75.0</u>	<u>--</u>	<u>--</u>	<u>127.5</u>
	359.3	200.0	50.0	--	609.3

<u>V. STAFF TRAVEL</u>					
Local Travel	67.6	60.0	—	—	127.5
Regional Travel	458.5	120.0	10.0	10.0	598.5
Extra Regional Travel	30.0	—	—	—	30.0
Other Travel Project Manager	25.0	—	—	—	25.0
<u>VI. TRAINING/MEETINGS</u>					
UWI Extension Diploma Course	120.0	10.0	40.0	—	170.0
MSc and research courses	180.0	25.0	24.0	—	229.0
In-country meetings/workshops	42.0	5.0	—	100.0	240.0
Multi-country networks	90.0	50.0	—	100.0	240.0
In service and other					
Extension training	<u>314.5</u>	<u>10.0</u>	<u>16.0</u>	<u>100.0</u>	<u>440.5</u>
	746.5	100.0	100.0	400.0	1346.5
<u>VII. TECHNICAL COLLABORATION</u>					
USA	342.7	—	—	—	342.7
UWI	<u>107.7</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>107.7</u>
	450.4	—	—	—	450.4
<u>VIII. Overhead</u>					
Contingency	165.0	—	—	—	165.0
Evaluation and Financial	200.0	—	—	—	200.0
Reviews/Audits	<u>100.0</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>100.0</u>
	465.0	—	—	—	465.0
 TOTAL INPUTS	 5,000.0	 2,505.0	 1,460.0	 1,110.0	 10,075.0

TABLE 3

<u>DIRECT BENEFIT OF USAID FUNDS</u>				
	OECS	UWI	CARDI	TOTAL
1. Technical and Support Staff	1,041,100	249,000	444,000	1,734,300
2. Research and Training Centers	250,000	--	--	250,000
3. Equipment and supplies	198,500	165,500	50,000	413,500
4. Research and Extension Expenses	359,300	--	--	359,300
5. Staff travel	457,500	68,500	55,000	581,000
6. Training and meetings	514,700	42,000	190,000	746,500
7. Technical collaboration	--	202,000	248,400	450,400
8. Overhead	--	165,000	--	165,000
9. Subtotal	2,821,100	891,500	987,400	4,700,000
10. Contingency	120,048	37,936	42,016	200,000
11. Evaluation Financial Review/Audits	--	--	100,000	100,000
G. Total	2,941,148	929,436	1,129,416	5,000,000
% of Total	58	19	23	100

CARDI Budget
(\$000)

	89/90	90/91	91/92	92/93	93/94	Total
Technical & Sup Staff	274.8	288.6	303.0	262.6	185.3	1314.3
Res/Train Centres	50.0	100.0	100.0	-	-	250.0
Equipment & Supplies	90.0	40.0	20.0	20.0	15.0	185.0
Res & Exten Res Expen	61.5	64.1	66.7	69.5	72.5	334.3
Staff Travel	56.5	56.5	56.5	56.5	56.5	282.5
Training/Meetings	57.0	67.0	57.0	47.0	42.0	270.0
Technical Collaboration	45.5	47.9	50.2	52.7	55.3	251.6
Total	635.3	664.1	653.4	508.3	426.6	2887.7

UWI Budget
(\$000)

	89/90	90/91	91/92	92/93	93/94	Total
Technical & Sup Staff	122.5	128.2	98.1	34.7	36.5	420.0
Res/Train Centres	-	-	-	-	-	0.0
Equipment & Supplies	64.5	41.0	41.0	41.0	41.0	228.5
Res & Exten Res Expen	5.0	5.0	5.0	5.0	5.0	25.0
Staff Travel	66.0	66.0	58.5	54.0	54.0	298.5
Training/Meetings	89.0	142.0	89.0	106.5	50.0	476.5
Technical Collaboration	36.0	37.7	39.6	41.6	43.8	198.7
Total	383.0	419.9	331.2	282.8	230.3	1647.2
TOTAL	1018.3	1084.0	984.6	791.1	656.9	4534.9

V. IMPLEMENTATION ARRANGEMENTS

The implementation of the Agricultural Research and Extension Project will build on the mechanisms which are in place through AID support to CARDI under the FSRD Project (538-0099) and to UWI under the CAEP (538-0068). The project will be implemented by a Handbook 3 grant agreement with CARDI. The project will form a major part of CARDI's research and development programs as identified in CARDI's Strategic Plan. Under the terms of the agreement, CARDI will sub-grant part of the resources to UWI for implementation of those aspects of the project aimed at strengthening the national agricultural extension services. The terms of the sub-grant will be stated in a separate agreement between CARDI and UWI, to be signed as a Condition Precedent to the disbursement of funds under the Project Grant Agreement.

A. Project Management

A Project Management Committee, consisting of CARDI's Executive Director (or nominee); the Dean, Faculty of Agriculture, UWI (or nominee); the Head of the Department of Extension, UWI; the Deputy Executive Director (Development) CARDI; and the Project Manager will be responsible for overall implementation. The Project Manager will be selected by CARDI's Executive Director with concurrence of the Dean, Faculty of Agriculture, UWI and USAID. She/he will be located in St. Lucia, and will have responsibility for the day-to-day administration, supervision and financial management of all project activities. The Project Manager will ensure that an inter-disciplinary and inter-institutional approach is taken in the implementation, analysis and monitoring of project activities. The Project Manager will liaise with CARDI's Technology Adaptation Coordinator, who will be directly responsible for implementation of the CARDI component, and with the UWI Extension and Training Program leader who will be directly responsible for the UWI component. The Project Management Committee will be co-chaired by CARDI's Executive Director (or nominee) and the Dean, Faculty of Agriculture, UWI (or nominee). It will meet on a regular basis at 6 month intervals with extraordinary meetings to be called by either co-chairman as required.

The Project will have its administrative center in St. Lucia and will assume the administrative structure of the CARDI FSRD Project (538-0099). The structure and staffing have been reviewed by the RDO/C Controller's Office and found to be adequate for project needs.

B. Implementation Planning

CARDI and UWI will prepare a joint annual implementation plan which will be submitted to AID by the Project Manager in May of each Project year. This plan will specify actions to be undertaken and anticipated project accomplishments with each having specific objectives, benchmarks and targets. Included in the plan will be a budget and disbursement schedule keyed each to the annual implementation plan as well as the project monitoring and control procedures. The first annual plan will include a Management information system to facilitate the collection analysis and use of required information for management of the Project. USAID approval is necessary for disbursements for project activities in accord with normal AID procedures. In order to assist RDO/C in monitoring the project, the Project Manager will provide the following reports:

- a quarterly progress report detailing advances and expenditures (including counterpart) and implementation progress on the objectives, benchmarks and targets identified in the annual implementation plan;
- an annual report detailing accomplishments by activity and plans for the ensuing year.

Project Implementation Letter No. 1 will provide more specific guidance on data collection and reporting for Project monitoring purposes.

C. Administration of Funds

Funds will be committed by RDO/C through Project Implementation Letters in accord with implementation responsibilities and approved annual implementation plans. Funds will be disbursed to CARDI through regular AID procedures involving periodic advances (up to 90 days) and liquidations. CARDI will in turn disburse funds to UWI in accord with implementation responsibilities and approved annual implementation plans. CARDI will prepare a quarterly financial plan of projected financial needs on the basis of approved implementation plans and budgets. These financial plans will then be approved by USAID before an advance payment is made.

D. AID Project Management

ARDO will be responsible for AID project management. A direct hire USAID Project Manager will be assigned full time for this purpose. ARDO will be assisted in Project Management by the Project Development Office and the Controller's Office. In addition, other offices in RDO/C

will be called upon as needed. Each of these offices will assign a liaison person to work with the Project Manager. Together these liaison persons and the Project Manager will constitute the RDO/C Project Implementation Committee.

E. Procurement Procedures

1. AID

RDO/C will be responsible for entering into a direct contract with a U.S. Title XII institution to provide technical collaboration to U.W.I.

2. CARDI

CARDI will be responsible for procuring extra-regional research technical collaborators and commodities (see Annex for Illustrative List) and long-term U.S. training through a host country contract with U.S. based institution. CARDI will also procure the technical collaboration of UWI professors for specific assignments and collaboration on an individual and as needed basis.

3. UWI

UWI will be responsible for contracting UWI professors on an individual basis and for offshore procurement of the extension component (see Annex I for Illustrative List) and for up to \$25,000 of short-term extra-regional technical collaboration.

F. Waivers

Included in this offshore procurement are one 90hp tractor and communications equipment and Four 4 wheel vehicles. To supply an appropriate tractor and communications equipment, a source and origin waiver is requested from AID Geographic Code (000) to AID Geographic Code (935). To supply the vehicles the project will take advantage of the blanket waiver for right hand drive vehicles contained in State cable 092777.

The project plans to purchase one 90hp tractor with an estimated cost of US\$20,000 for experiment station use in St. Lucia. This size is required because it has adequate pulling power, but yet is small enough for maneuverability on experiment station plots. CARDI has checked with manufacturers of tractors which have service and spare parts available in the OECS countries and has found that tractors of fewer than 100hp are not manufactured in the

U.S. (John Deere is manufactured in Germany and Mexico, Ford in Brazil and Massey Ferguson in Canada and the U.K.).

The project also proposes to purchase video equipment (camera, recorder/player and accessories. See Annex I for complete list) to improve the capability of the Department of Extension, UWI, to produce video training materials. The estimated value of this equipment is US\$18,000. A review of the manufacturers of this equipment by UWI has revealed that the most appropriate equipment in terms of state-of-the-art reliability, service and spare parts is manufactured in Japan. In addition, the video equipment which UWI already has is of Japanese source and origin and, therefore, compatibility dictates the same source and origin.

Further analysis indicates that some video equipment and tractors are manufactured in Code 941 countries. However, since the supply is variable and the quality questionable, there is no certainty that at the time of procurement it will be possible to find suitable video equipment or a 90hp tractor in a Code 941 country. Therefore, every effort will be made to purchase the equipment from a Code 941 source and origin. If this proves not to be possible, the equipment will be purchased from Code 935.

G. Implementation Plan and Schedule

The project will be implemented over a five-year period. Final project negotiations will be concluded during March 1989, and the project will be authorized by May 1, 1989. The Project Agreement will be signed during the first two weeks of April and conditions precedent (CPS) to initial disbursement completed by April 30, 1989. Project activities will begin May 15, 1989, and continue through the PACD of March 31, 1994. An Illustrative Life-of-Project Implementation Schedule is as follows.

Illustrative Life of Project Implementation Schedule

<u>YEAR</u>	<u>ACTION</u>	<u>TIMING</u>
1989	Project Paper Approved	March
	Project Agreement Signed	April
	Sub-grant with UWI signed	April
	Initial Conditions Precedent met	May
	First RAECC Meeting (funded under FSR/D Project)	April
	First year implementation plan submitted and approved by AID	May
	CARDI negotiates contract for technical collaboration and procurement	June
	AID negotiates technical collaboration contract for UWI	July
	UWI initiates procurement	July
	CARDI initiates procurement	July
3 MS. students begin programs	September	
1990	UWI procurement completed	January
	Second year implementation plan submitted and approved by AID	May
	CARDI procurement completed	July
	3 MSC students begin programs	September
	Five extension Degree students begin programs	September
RAECC meeting held	October	
1991	Third year implementation plan Submitted and approved by AID	May
	Mid-term external evaluation	June
	First group of MSC students finish program	August
	Five extension Degree students begin programs	September

<u>YEAR</u>	<u>ACTION</u>	<u>TIMING</u>
1992	Second RAECC meeting held	March
	Fourth year implementation plan submitted and approved	May
	Five extension Degree students begin programs	September
1993	Fifth year implementation plan submitted and approved	May
	Five extension Degree students finish programs	August
	Second group MS. students finish programs	August
	Project internal evaluation carried out by CARDI, UWI and USAID	September
	Third RAECC meeting held	November

H. Extra-Regional Technical Collaboration

CARDI and UWI have developed productive relationships with the South East Consortium for International Development (SECID) and the Midwest Universities Consortium for International Activities (MUCIA), respectively, under the current FSRD and CAEP Projects. It is likely that AID will receive requests from CARDI and UWI to continue these relationships under this Project. In addition, CARDI is interested in establishing a relationship with the University of Florida on tropical fruit production. On the research side, CARDI will enter into a host country contract(s) for a total of approximately \$215,000 of technical collaboration and \$85,000 for commodity procurement. On the extension side AID will enter into a direct contract for technical collaboration estimated at \$98,000.

I. Evaluation Plan and Financial Reviews

Two in-depth evaluations will be conducted during the life of the project. The first of these will draw upon outside consultants to complement CARDI, UWI and AID personnel, and will take place at the beginning of the third year of the project. The objective of this evaluation will be to examine the extent to which the project is achieving its objectives and to reconfirm the soundness of the overall strategy or to modify this strategy as warranted. Particular emphasis will be paid to progress in: 1) improving the capability of National Extension Services; 2) the degree to which CARDI is identifying programs to solve production problems of crops included in the OECS Diversification Plan; 3) the extent to which UWI, CARDI and National Extension Services are integrating the technology generation and transfer program; and, 4) the likelihood that expected outputs will be achieved by the end of the project. It is estimated that this evaluation will require 12 person weeks of consultant services at a cost of \$50,000.

The second evaluation will be conducted by CARDI, UWI and RDO/C staff at the beginning of the fifth year of the project. This in-depth evaluation will be an impact evaluation to assess the achievement of project objectives and document the lessons learned.

In addition to the two evaluations, periodic financial reviews/audits will be carried out under the direction

of the RDO/C Controller's Office. It is anticipated that these reviews/audits will be contracted to a well-known financial services firm with offices in the region.

J. Training

1. Extension Diploma

Extension Diploma - UWI, in conjunction with National Extension Services, will program this training and will carry out the training at UWI facilities in Trinidad. It is anticipated that participants will complete this one year program in two groups of 5 each beginning in years two and three of the project.

2. Post Graduate Training

The 12 person years of post graduate training will be jointly programmed by CARDI and UWI through the mechanism of the Project Management Committee. It is anticipated that the majority of training will take place at UWI, Trinidad. Any extra-regional post graduate training will be implemented by CARDI through its host country contract for technical collaboration and commodities mentioned earlier.

3. Intra-Regional and In-Country Training
--short-term

This training will be programmed by CARDI and UWI in the Joint Annual Implementation Plans and carried out by the relevant institution.

METHODS OF IMPLEMENTATION AND FINANCE

The following provides information relating to the methods of implementation and financing for the funds to be obligated under this Project:

<u>Activity</u>	<u>Method of Implementation/ Financing</u>	<u>Amount</u>
1. Technical support staff	Direct Reimbursement	\$1,734,300
II. Research/training centers	Direct Reimbursement	250,000

III.	Equipment and Supplies	Direct Reimbursement	413,500
IV.	Research and Extension expenses	Direct Reimbursement	359,300
V.	Staff travel	Direct Reimbursement	581,000
VI.	Training meetings	Direct Reimbursement	746,500
VII.	Technical collaboration	USAID Direct Payment	450,400
VIII.	Overhead	Direct Reimbursement	165,000
IX.	Contingency	Direct Reimbursement	200,000
X.	Evaluations/Financial Reviews/Audits	USAID Direct Payment	100,000
TOTAL			<u>\$5,000,000</u>

VI. PROJECT ANALYSIS

A. Technical Analysis

Design of the technical aspects of this project has benefitted from AID's experience with two research projects which have been implemented by CARDI since 1978 and with the Caribbean Agricultural Extension Project (CAEP) implemented in conjunction with UWI beginning in 1980.

As a result of these projects, a farming systems research and development methodology as a primary research strategy and a farm management methodology as a primary extension strategy have been adopted. The technical analysis addresses the appropriateness of these two methodologies in the context of the Eastern Caribbean. The technical analysis also discusses the procedures for setting research and extension priorities among the various commodities of economic importance in the region; reviews progress and lessons learned under the CAEP Project in improving national extension services and discusses the desirability of improved research/extension linkages. The analysis also explains the importance of pest management research and specifies CARDI's role in this research.

1. Methodologies

Two factors are primary in choosing appropriate methodologies for research and extension strategies: (1) the complexity of the farming environment of the Eastern

Caribbean and (2) the advantages of getting researchers and extension staff working together with farmers to identify needs and desires, develop improved technologies to respond to those needs and desires, and communicate information to make farmers aware of new opportunities.

The farming systems that have evolved in the Eastern Caribbean involve combinations of commodities -- crops and animals -- influenced by a range of factors including family needs, technologies, labor availabilities, input availabilities, soil, climate, custom, information, and others. The focal point of these farming systems is the decision-making process of the farm household, but even this can be complicated by gender or other factors. If the decision-making process is understood accurately, farmer behavior surfaces as logical responses to economic and social opportunities, given existing constraints.

Farming systems research and development methodology has been discussed in detail in previous project papers. In brief, it consists of identification of key problems through initial reconnaissance surveys (sondeos) by teams of researchers and extensionists; on-station research to assess available technology; the design and testing of new innovations to solve remaining problems; on-farm testing of alternative innovations by researchers with the involvement of extensionists and farmers on a greater number of farms and under specific agronomic conditions; and demonstrations on farmer's fields to further adjust the technology and disseminate improved technologies to other farmers. Because of the complex nature of the region's small and medium scale agriculture -- physical, human, and institutional factors which change from country to country, region (within country) to region, and even, sometimes, farm to farm -- farming systems research methodology (FSR/D) is appropriate for the OECS.

Detailed explanation of the home/farm management budgeting methodology is also given in previous project papers. The essence of the home/farm management budgeting methodology is to help the farm family analyze its whole-farm operation with attention to cash flow, costs of inputs, use of labor, return on investment, and alternative farm profit opportunities. The farmer is viewed as a resource manager and small enterprise decision-maker capable of considering alternative investment strategies and consequences, including risk-reward analyses.

The linkage between farming systems and farm management is that the former serves as a problem-identification framework, e.g., what commodity combinations and practices might improve income, while the latter serves as a framework for working with the individual farm families within the context of the whole farm operation to understand the implications of adapting new farming systems. This is a particularly insightful combination in the context of introducing new commodities, e.g., non-traditional export commodities which have not been major components of the farmer's system previously.

More attention to two aspects would considerably strengthen the CARDI and UWI research and extension methodologies. First, FSR/D is only as successful as the commodity research which provides the commodities of which any system is composed. Collaborative research networks must be much more effective in linking CARDI to new sources of improved germplasm and CARDI commodity and technology adaptation researchers must be much more effective in working together to identify and test combinations of commodities, varieties, and practices which will provide higher returns (or other desired benefits) to the farmers. Second, gender is a variable which FSR/D and farm management researchers need additional help from trained social scientists (including economists) to understand especially how the gender of farmers influences what they are willing and able to do.

2. Priorities

Neither CARDI, UWI, or the OECS ministries of agriculture have unlimited financial resources. They must make choices to make best use of their scarce trained resources, their technical staff. CARDI's Strategic Plan identifies six factors to guide its research priorities:

- o Technical feasibility -- the potential for resolving the particular technical problem within a reasonable cost and time frame, its probability of success, and environmental soundness.
- o Potential economic impact -- the economic value to the region or member states if the efforts are successful.

- o Member emphasis -- the priority which member states place on the research activity compared to alternatives.
- o Resources required -- the financial and human costs to implement the research during the time-frame required to show results.
- o Comparative advantage -- whether CARDI has a clear advantage over other entities that might do research.
- o Synergy -- the strategic fit with CARDI's other activities.

From these criteria, CARDI has made choices such as emphasizing adaptive research (leaving basic genetic improvement to international agricultural research centers) and not carrying out research on bananas (which WINBAN is carrying out).

For purposes of the AREP, CARDI went a step further by identifying priorities for each of the seven OECS countries. In each case it specified results expected, research focus, assumptions, staff involved, and stations and other facilities utilized. It should be noted that the initial set of priorities is preliminary. The priority-setting exercise will be included in the annual planning cycle of CARDI (in which the OECS countries play an active role), with active participation by UWI staff. The first set of priorities is included in Annex E. CARDI plans to use project financed technical collaboration to assist in research priority setting.

3. Improving National Extension Services

The draft report of the recent CAEP external evaluation concludes that National Extension Services now have "the ability to articulate educational roles and functions, to impact farmer behavior through contact with frontline extension officers, to store information through national and regional communications activities and to help shape a more professional, optimistic future oriented agricultural sector." The report goes on to say that unless regional input is available, the character and effectiveness of some of these programs will be maintained at minimal levels while others will regress and deteriorate. The report recommends that:

- 1) a regional coordinating and communication function such as REACC continue with the express purpose of sharing information, supporting regional programming and continuing the process of increasing the professionalism of extension services and the people involved in Agriculture.
- 2) Sources of technical assistance be maintained to help National Extension Services create and maintain practical and effective managerial procedures to meet their individual and changing needs.
- 3) That efforts and mechanisms be supported to coordinate and integrate the various multinational, regional and national programs focussed on agricultural sector development.
- 4) Programs of coordinated regional inservice training, specialized diploma and degree training, and regional backstopping be continued to maintain and enhance the professional capability of Extension personnel.

4. Research/Extension Linkages

Research and extension can make direct contributions to increasing the yields of major commodities, but can also impact greatly on other aspects of production and marketing. In a country such as the U.S., it is estimated that as much as ninety percent of research expenditures are allocated for so-called maintenance research. Other research is directed at learning appropriate agronomic practices, e.g., plant density, cultivation practices, fertilizer amounts and timing, moisture amounts and timing, to increase yields and incomes. Research helps to identify and test the adaptability of new crops. It also contributes to learning about farming systems which best combine several crops and animals to increase farm household income. Moreover, improved research techniques can identify and test systems which make more effective use of, and provide higher income levels to, women in agriculture, as demonstrated under the AID-funded FSR/D program. Research is also used to identify sustainable agricultural systems, which at the same time increase

production and sustain and enhance the natural resource base. Extension must be an integral part of the whole process of improving productivity. In a mature research and extension system, the two processes integrate, and serve to mutually reinforce one another. However, extension, in practice, is generally thought of as the communication of research information to (and from) the farmer or other end-user. In the economic analysis for this Project it was found that extension both increased the speed of adoption and for most commodities doubled the predicted adoption rates.

It is considered desirable to have agricultural research and extension as integral parts of one institution. Such is the case in the U.S. as part of the land grant university system and in other developed and developing countries. This type of arrangement facilitates the planning, programming, budgeting and communication necessary to develop and transfer technology and to provide feed back on technology acceptance and relevance.

In the Eastern Caribbean, each country has its own extension service but because of limited resources cannot support a fullscale research program. CARDI, as a regional organization provides the research service for all of the countries. The problem then of research and extension integration is more difficult. It is recommended that this Project support research and extension linkages throughout the OECS countries by encouraging a) equal representation of CARDI and UWI on a project management committee; b) CARDI, UWI and to the extent possible National Extension Services (NES) staff to maintain joint offices in St. Lucia and Antigua; c) participation by UWI and NES staff in the annual program planning process of CARDI and participation of CARDI staff in the annual program planning of the NES; d) acceptance by all parties of the key role played by technology adaptation specialists in the technology generation and transfer process; and e) collaboration of CARDI and NES staff in rapid reconnaissance surveys.

5. Pest Management and Pesticide Control

Pests and diseases are constantly adapting to natural tolerance or resistance bred into varieties and to chemical or biological control. Therefore, much research is directed at discovering new means of pest and disease

management. Looking at the research priorities attached to the technical analysis in Annex E and the research topics identified during the economic analysis (Annex F) it is clear that the majority of the program involves problems in pest management. Pest management is not only a research topic. Extensionists need to make sure that pest management recommendations reach the farmer in a usable form. The UWI Department of Extension has published numerous information bulletins on pest management recommendations and pesticide use. It has also recently completed a video entitled "Pesticide Use and Abuse." UWI extension specialists work with NES to insure that recommendations and other materials reach farmers.

The regulation of pesticide introduction and use in the region is the responsibility of the various island governments and generally resides in the Ministry of Agriculture. Each island has a fairly uniform Pesticide Control Act which governs pesticide entry and use. Some of the countries also have developed regulations which are used to implement these acts. These regulations generally include a pesticide review board which is responsible among other things for reviewing all pesticide entry permit applications. CARDI staff generally provide the technical expertise on these review boards. CARDI has no regulatory function regarding pesticide entry and use nor should it have as a regional research organization providing pest management recommendations. Nonetheless, we do have a covenant which requires AID approval for all procurement of pesticides.

B. Economic Analysis Summary

Agricultural productivity gains in the OECS can provide food, generate income and employment, and earn or save foreign exchange. Increased production of commodities listed earlier in Table 5 can reduce the variability of both EC income and foreign exchange earnings. Improved nutrition as well as income and employment effects in other sectors can also result from agricultural growth. Numerous studies have examined the impacts of agricultural research and extension for a wide variety of commodities and countries. The vast majority of these analyses have indicated rates of returns to public R & E investments well in excess of the 15/20% which private firms might consider necessary for investment with similar risk levels. Private firms, however, would have little incentive to undertake sufficient research on these commodities because it would be difficult to maintain proprietary rights to the research information produced.

For the research and extension efforts of CARDI and UWI supported by this project, one can hope that the rates of return would be equally as high as those measured in other countries. This may or may not be true, however, and therefore a quantitative evaluation of the net benefits of agricultural research and extension in the Eastern Caribbean was conducted and is summarized here (The complete economic analysis is attached as Annex F.)

An evaluation of projected impacts of agricultural research and extension undertaken by the EC countries must answer three questions:

1. What are the chances of producing new knowledge or technologies if resources are allocated to particular commodities or problem areas,
2. What will be the demand (adoption) of that knowledge or technology (with and without extension), and
3. What would be the value to society of that knowledge or technology?

CARDI scientists knowledgeable about the different commodities and areas of research helped answer the first question.) The expected per unit cost reduction if research is successful, the probability of research success, and the timing with which research results can be expected were ascertained for fourteen of the most important commodities in the research and extension program. CARDI personnel and an extension specialist for the Windward Islands helped answer the second question about the timing and geographical spread of the research results with and without extension. The third question concerning the economic value of the research to society was evaluated using standard benefit/cost analysis in which changes in economic (consumer and producer) surplus were calculated which reflect the differing market situations for the individual commodities. Internal rates of return and the net present value of research and extension investments were calculated.

The social valuation of research benefits required data or information on quantities produced or traded, farm level prices, and domestic and foreign price elasticities of demand. Research and extension costs were allocated to individual commodities for the analysis.

Availability and quality of basic quality, price, and trade data are limited for most agricultural commodities in most of the EC countries. Estimates were made where possible based on recent historical figures from ministries of agriculture in different countries and from tables in other studies. When sources conflicted, judgments were made but the figures provided at least a benchmark against which sensitivity analysis could be performed. For commodities for which data were completely lacking or particularly suspect, no quantitative analysis was conducted.

The first set of commodities analyzed were those listed in Table 5 as being produced for the local market. The EC currently imports these commodities but can do little to influence the world price. The net present value evaluated with a 10% discount rate is projected to be 1.4 million EC dollars (\$0.53 million US) for cabbage and \$1.3 million (EC) or \$.48 million (US) for tomatoes. The projected internal rates of return to research and extension are relatively high (83% for cabbage and 53% for tomatoes) compared to other commodities reflecting sizable per unit cost reductions due to research and extension, relatively broad and rapid adoption rates, and the fact that new research can build on previous research at CARDI and in other countries.

The second set of commodities analyzed were the traditional exports of cocoa and nutmeg and two non-traditional exports, ginger and pineapple, which the EC countries can export with little effect on price because it is a small exporter in the world market for these products. The net present value of economic gain due to research and extension is projected to be \$2.6 million EC (\$.96 million US) for cocoa, \$3.8 million EC (\$1.4 million US) for nutmeg, \$1.5 million EC (\$.55 million US) for ginger, and \$.6 million EC (\$.22 million US) for pineapple. The projected internal rate of return to research and extension for cocoa is 50 %, for nutmeg is 65%, for ginger is 3%, and for pineapple is 28%. The high rates of return to cocoa and nutmeg reflect in part the relatively high per unit prices for these commodities. The low return to ginger reflects the current low production base and high research costs. Achieving the 28% return on pineapple is contingent upon a large acreage expansion of the commodity.

The third set of commodities is a series of non-traditional export crops. Several of these are root crops (sweet potatoes, dasheen, eddoes, tannia, yams)

while others are spices and fruits (hot peppers, plantain, mango). Other fruits such as passion fruit, breadfruit, soursop, and avocados were not analyzed due to a lack of data. The net present value of economic gains due to research and extension is \$4.5 million EC (\$1.6 million US) for sweet potatoes, \$5.1 million EC (\$1.9 million US) for dasheen and eddoes, \$2.7 million EC (\$1 million US) for tannia, \$6.6 million EC (\$2.4 million US) for yams, \$.12 million EC (\$.045 million US) for hot peppers, \$.53 million EC (\$.2 million US) for plantain, and \$1.5 million EC (\$.55 million US) for mango. The projected internal rates of return to research and extension are 49% for sweet potatoes, 41% for yams, 70% for dasheen and eddoes, 49% for tannia, 18% for hot peppers, 21% for plantain and 24% for mango. The high returns to the root crops reflects their relatively large production bases. The lower returns for hot peppers, plantain, and mango reflect their smaller production bases in relation to their projected research costs.

Two key assumptions, the expected proportionate cost reductions due to research and extension and the expected prices, were allowed to vary to test the sensitivity of the predicted rates of return. The rates varied roughly in proportion to the changes in either assumption. In other words, a halving of the projected cost reduction, also halved the rate of return.

The representative benefit/cost analyses presented above suggest relatively high rates of return on public investments in agricultural research and extension in the seven Eastern Caribbean countries. These rates under a set of baseline assumptions range from 3% to 83% with a median return of 49%. Even if projected per unit cost reductions due to research are halved, the projected returns are still high enough to justify public support in the aggregate, although CARDI needs to carefully plan its allocation of funds as benefits differ substantially by commodity and type of research. The net present value of research and extension needs to be examined as well as the internal rates of return, because commodities with equal rates of return can have sizable differences in net present values. Sweet potato and cocoa, for example, have similar rates of returns to research and extension, but sweet potato has a much larger net present value because its value of production is greater.

Another very important economic benefit from CARDI research and its extension will result from the maintenance of current production levels and costs. Even if no yield increases or per unit cost reductions are realized due to research and extension, if current yields

and per unit costs are stopped from deteriorating as insects and diseases evolve and attack the commodities, then the research and extension will have generated substantial benefits. Evidence from other countries indicate that the maintenance of current yields accounts for about one-third of the benefits from agricultural research.

In addition to the direct economic impacts due to yield increases on per unit cost reductions, research and extension can affect employment, product quality, nutrition, foreign exchange, and industrial development. Because all of the commodities being considered are exported or imported, price reductions due to research and extension induced supply shifts are relatively small. Consequently, research and extension can have positive effects on employment within the agricultural sector because total agricultural revenue increases as supply shifts out. Furthermore, researchers indicated that quality effects would result from the research on several commodities and these effects are not fully captured in the rates of return presented earlier. Nutrition effects will result primarily from the higher agricultural incomes. Additional foreign exchange earnings will help pay foreign debts and stimulate overall economic development.

The internal rates of return presented earlier reflect the effects of both research and extension efforts. A questionnaire was used to obtain information on research adoption rates with and without extension. For most commodities, extension expenditures both increased the speed of adoption and in most cases, doubled the predicted adoption rates.

Finally, the results of the analysis, presented in more detail in the annex to this paper, provide some guidance to help track the success of the proposed research and extension project both during and at the end of the five year project. While most of the research results are not projected for release until year 3, mid/term evaluators should question researchers about their progress in developing the new cultural practices, disease and insect controls, post/harvest techniques, etc.. CARDI should continue to generate detailed information on the production costs associated with these improved technologies (and any price differentials due to quality changes). Then in the latter years of the project, adoption rates associated with new technologies should be examined and the same spreadsheets used, for the analysis

presented here can be updated, to reevaluate the benefits from the research. While many of the benefits would be yet to come after 5 years, a much more accurate picture of per unit cost reductions, probabilities of research success, and adoption rates for the early years, would be available. These spreadsheets can also be used on a periodic basis during the project when CARDI or UWI needs to justify their allocation of research funds to EC policy-makers who may be suggesting alternative allocations of research and extension funds.

C. Social Soundness Analysis

The direct beneficiaries of the project include broad groupings of individuals within the following three target populations: 1) CARDI and UWI professional staff, including research and extension related personnel, and managerial and executive levels; 2) small farmers of the Eastern Caribbean States and their respective associations and organizations, who will be the primary beneficiaries of project technologies and the transfer and adaptation of these technologies at the farm level; and 3) agriculture policy decision-makers, including key personnel within the Ministries of Agriculture and higher echelons within the governments of OECS countries who will be participating in and are influenced by the project.

The design of the AREP project builds upon the initial successful results of two previous RDO/C projects (the CARDI Farming Systems Research and Development project and the Caribbean Agriculture Extension II project). The project is also directly supportive of CARDI's reorganizational plan and five year strategy. Based on these initiatives, one can say that the project has already been tested for appropriateness and compatibility of agriculture research and extension activities with the agro-climatic and socio-economic environment of the Eastern Caribbean island states. However, the project will incorporate and strengthen several approaches for parallel agriculture research and extension activities. These activities are designed to ensure closer coordination, communication and more effective dissemination and adoption of project technologies.

To more fully understand the project's contribution to and impact on the socio-cultural environment, its spread effect and diffusion of information, and the social consequences and incidence of benefits of project activities, each one of the proposed methodologies and strengthened project approaches needs to be assessed.

1. Integration of Research and Extension.

Central to the accomplishment of project objectives is the integration of research and extension at the regional, national, district and farm levels. A Regional Agricultural Extension Coordinating Committee, comprised of representatives of Ministries of Agriculture, farmer's representatives and regional organizations including CARDI and UWI, will serve as a vehicle for planning, overseeing and providing advisory assistance for project activities in this area. The interplay among these various groups and their ability to work in harmony, participate in the decision-making process, develop a consensus of opinion when called for and effectively represent the needs and interests of their respective groups, are all critical to project success. In addition, the project will initially finance the provision of six Technology Adaptation Specialists to work within the UWI project organizational structure. These six individuals will serve to bridge the gap between research and extension activities planned under the project. Technology Adaptation Specialists will focus on eliciting feedback from farmers and monitoring farm/home management activities, training extension personnel in the application of production technologies at the farm level, and, ensuring that research and technologies developed under the project are feasible and fully address the constraints and/or opportunities that are present within the Eastern Caribbean.

The proposed collaborative and integrated approach to the delivery of research and extension services will have an impact on many project activities. Particularly, the planning and setting of agendas for project-funded training and workshop sessions involving research and extension. Also, the application and utilization by small farmers of improved technologies at the on-farm level, will be directly effected by the integration of project research and extension.

There is solid evidence which supports the expected impact and spread effect of the project's research and extension activities. Project outputs can be maximized through a planning and implementation process that incorporates the guidance and direction of representatives from the three

principal beneficiary groups. Project evaluations carried out on the FSR and CAEP projects point to the good working relationships established to date between small farm beneficiaries, agriculture extension agents and the corresponding research and extension institutions of CARDI and UWI. There is a mutually beneficial relationship between these three groups which the AREP project proposes to take advantage of and build upon through the implementation of joint agriculture research and extension programs.

In a like manner, representative's of OECS Ministries of Agriculture have witnessed the benefits of the two previous projects as well as other research and extension efforts. Ministry officials regularly and actively participate in regional agricultural policy and technical fora. Frequent communication on an official and informal basis between Ministry representatives and the professional staffs of regional agricultural organizations are also a part of the CARDI joint planning process. OECS Agriculture Ministries have also made recent strides in opening channels of communication with small farmer groups and private sector agricultural marketing and supply companies. The project will incorporate the mutual interests of the three target groups, and take advantage of the knowledge and experience they bring so as to greatly facilitate institutional coordination and the project implementation process.

2. Agricultural Diversification.

In line with the RDO/C agricultural strategy of concentrating on improving efficiency in farming, especially in non-traditional export crops, the AREP project will provide research and extension services for small farmer crop diversification programs. A concern of the project is that small farmers may not be willing or able to adopt new technologies necessary to produce non-traditional, diversified crops for the export market or for import substitution crops sold on domestic markets.

Clearly, the Eastern Caribbean countries have a comparative advantage in many non-traditional agriculture export products as well as products which can be substituted for current imports. Recent studies show that crops such as breadfruit, mango, cashews, golden apple and carambola can generate significant foreign exchange earnings and at the same time increase profits at the farm

level. In addition, many import substitutes including peppers, pumpkins, green beans, cucumbers, cabbage and some fresh meat products have considerable local demand, profit potential and can save scarce foreign exchange. In some cases project financed studies, which take into account distortions in the market, will help to guide the selection of crops that are the most appropriate for the Eastern Caribbean farmer. Thus, the project will focus on specific targets of opportunity to be determined by market forces, and the adaptability of diversified crop technologies to small farmers.

The project will also address the concern of small farmer adaptability through a process of 8-10 day rapid reconnaissance visits undertaken by front-line extension workers. The extension agents, in turn, will transmit their findings directly to project researchers and Ministry of Agriculture officials. First-hand familiarity with farmer's problems, needs, and resources will be gained through these periods of intensive data collection and review. The information will be disseminated widely to other researchers, Ministry administrators and public policy-makers to better direct and guide project activities and enhance the project's spread effect.

Within the crop diversification approach at the small farm level, there also exists the potential for adverse effects. A dependency of the small farmer on off-farm income to provide subsistence level earnings to support a family could be an obstacle to increased production of labor intensive, non-traditional export and import substitution crops. Although the only reliable data on off-farm income is now more than ten years old, it would still appear to hold that a significant portion of small farmer's annual income is derived from either work done on other farms or through non-farm activities (approximately 50% of income was derived from other than farm income for small farmers in Antigua and Montserrat, based on a 1976 study). These other-income activities also have the tendency to be gender specific. Moreover, since women are responsible for a significant percentage of the small farmer earning power in the Eastern Caribbean (see Gender Analysis Section), their role in child rearing dictates that less time may be available for on-farm work. Thus, project extension activities could face implementation problems if farmers cannot give full attention to their plots of land and the efficient application of project research and technologies.

RDO/C recently financed an Eastern Caribbean regional agriculture sector assessment, whose findings were presented in November of this year. The results suggest there are other key constraints to increasing the production of non-traditional exports in the Eastern Caribbean states. Constraints identified included the lack of export market knowledge needed to direct the production and post-harvest handling technology. Another constraint is the organization of farmers so that the necessary minimum volume of product for export profitability can be attained. Although these barriers to increased crop diversification for the export market represent potential adverse effects, which may temper expectations for large-scale, rapid progress in the sector, project and other resources will be fully focussed on the alleviation of these potential constraints.

In addressing these cultural and social constraints, the project will implement diversification activities on a gradual scale. Criteria will be established for the pre-selection of small farmer participants and corresponding test plots. A considerable amount of initial data regarding small farmer adaptation has already been gathered and analyzed under the two previous projects. Likewise, all agronomic inputs will be suitable to the unique characteristics of each island. Criteria will be established in order to identify those farmers who have the capabilities to participate fully and the potential to achieve success in the technology adaptation and extension programs. Project-funded field research and experiment stations will be on pre-selected farms to allow for maximum supervision, communication and more effective transfer of technology for the benefit of farmers and farm groups.

The High Impact Agricultural Marketing and Production (HIAMP) project funded by AID will soon be reoriented towards increasing market knowledge and marketing skills. Once modified, the project should lend both technical and financial support to the AREP project diversification activities. In addition, the West Indies Tropical Produce Support Project (TROPRO), will conduct critical foreign market analysis and provide follow-up operational support to align production and marketing inputs to meet market demand. Good results from this project will help accomplish the export marketing objectives of AREP.

Another positive factor in overcoming perceived and real constraints to crop diversification is the strong ideological and psychological backing which CARDI, OECS and CARICOM officials lend to the longer-term objective (beyond the life-of-project) of carrying out crop diversification initiatives in the Eastern Caribbean. The AREP project will provide the critical initial assistance for a longer-term intervention, which CARDI fully expects to continue funding with core budget revenues in accordance with its five year plan.

3. Farm/Home Management.

A major thrust of the project is the implementation of extension service activities by means of the farm/home management approach. This approach, developed and employed on a limited basis under the CAEP II project, incorporates a farming systems concept by drawing together research and extension activities for the maximum productive/income benefit of farmers. Project outputs expected from the farm/home management approach will serve to optimize farmer economic benefits attributable to the overall farm unit. For example, improved efficiency in cost budgeting, recording of crop yields and corresponding farm gate and other market prices, will enable small farmers to better determine their most productive/profitable niche in agriculture. Once the on-farm cost and technical analyses are made, the approach will focus on the feasibility of farm-related activities, based on gender-specific criteria whereby the role of women in non-traditional farm production, marketing and other viable activities is assessed, and appropriate technical assistance applied (see section on Gender Analysis).

The proposed communication systems in support of the farm/home management approach will include radio and video programming, and desk-top publishing capabilities within CARDI and UWI for improving the flow of information and the quality of documentation. The application of the communications support systems will be heavily focussed on farm/home management activities. Communications support will include documentation and training materials for assistance in farm finance, marketing and management, farm record keeping and administration and small farm

enterprise development. The receptivity and adaptability by small farm households will be key to successfully carrying out on-farm activities. To a great extent, successful implementation of the various aspects of farm/home extension services will also depend on the expertise of extension workers, and the support mechanisms or resources which the extension workers can draw on for assistance.

Pre-qualified farmers will have demonstrated (under the CAEP II project) their capacity for assuming risk and improving their own on-farm economic situation. Most likely this has occurred by means of crop diversification and on-farm and off-farm entrepreneurial initiatives such as cooperative marketing or small or micro-enterprise development. For these farmers, the benefit of the farm/home approach will be the administrative /management skills and farm-related enterprise development advisory service gained from working directly with a project extensionist for a specified period. The extensionist will bring to bear on small farmer constraints and problems considerable amount of small farm management and technical expertise. Women participants will also receive priority in terms of training and assistance in gender-appropriate small farm production and enterprise development. Project assistance in this area will be designed to directly complement existing and new means of on-farm and off-farm production by women.

Important to the accomplishment of overall project objectives will be the job creation benefits of the small farm component. It is envisioned that the project will generate additional opportunities for on-farm employment. Technical skills gained and increased production levels achieved through the project will encourage other small farmers and workers to pursue diversified agricultural opportunities. The project will allow for the testing of ideas and management techniques in micro-enterprises related to their primary farming business.

The farm/home approach also contemplates the use of additional resources from the recently merged CARDATS program. The highly intensive nature of the CARDATS program requires close attention and coordination when allocating resources for alleviating and resolving small farmer constraints. CARDATS resources will only be

applied to those constraints areas identified by project management and the CARDATS program director as having highest priority, and which fall within the strategy and guidelines of the CARDATS program.

Other Project Beneficiaries.

There are a considerable number of other project beneficiaries who will stand to gain by the project. There are many mid-level technicians in research and extension programs of CARDI and UWI, and higher level professionals who will benefit either by new or upgraded skills. Educational and training opportunities will be derived from project-financed training programs (both through local level in-country training at regional workshops and seminars, or through other-country participant training programs), or by the facilitation and enhancement of their respective job functions due to mechanization or otherwise improved and more efficient working conditions. Included among these other direct beneficiaries are full time and part time Ministry of Agriculture staffs and extension agents; field research staff benefitting from new training facilities and laboratory equipment; ten OECs agriculture extensionists receiving one-year degree scholarships at UWI; project front line extension workers who will attend quarterly workshops to improve their skills in key areas, with the project mid-level research staff and senior staff benefitting from a broad array of training opportunities financed under the project; and lastly, the project will fund Masters level training for six key Ministry of Agriculture and/or project staff, most likely to take place at CATIE or other renowned institutions in this hemisphere.

Gender Analysis -- Issues/Actions

During the planning phase of the CAEP project a comprehensive gender analysis was carried out which showed, among other things, that: 1) there are high levels of women's participation in agriculture, especially in small farm households; 2) there exist gender-differentiated income streams within farm households which imply different stakes or interests in agricultural improvements for men and for women farmers; and, 3) compared to other regions of the world, women are often more constrained than men in their access to and use of productive resources.

The design of the CAEP project, in terms of its focus on gender issues, was based on a considerable amount of data which pointed to a major role being played by Caribbean women in the agriculture sector. Data from 1979, which is still valid today, showed the following proportions of women in the agricultural labor force in the Eastern Caribbean: Antigua, 50%; St. Kitts/Nevis/Anguilla, 45%; St. Lucia, 47%; and St. Vincent 30%. Research carried out in 1981 on St. Lucia and St. Vincent provided more detail on these trends. On St. Lucia, women were the principal farmers in 43% of all small farm households. On St. Vincent, women were the sole farmers in 24% and the principal farmer along with a male partner in 40% of the households surveyed. In addition to their role as food producers, women in the Eastern Caribbean had major responsibility for child support. In St. Lucia, 80% of all live births took place out of wedlock. In such cases the mother is typically the main provider. Separate income streams were the norm even in households with a male present. Women were solely responsible for paying for family food in 37% of the households surveyed (food represented 40% of household expenditures), support of children in 31%, transport in 22%, medical needs in 29% and farm supplies in 22%.

Another independent study initiated and carried out during the project's planning phase by the local CAEP Director and Co-Director, examined male and female roles in farm planning decisions on three islands: i.e. Dominica, St. Lucia, and St. Vincent. They found that family members were highly significant sources of advice and opinions on farm planning and on the adoption of innovation. The study recommended that the whole family be more directly involved in the extension educational process. Also, the study suggested that extension workers may neglect as many as 20% of female farmers in their contacts.

The CAEP project design was also based upon early input from both local and U.S.-based groups who promoted the incorporation of gender issues into the project. The Women and Development Unit (WAND) of the Extra-Mural Department of the University of the West Indies worked with the Department of Agricultural Extension, and provided sessions describing women's role in agriculture in the training courses for extension agents. At the same

time, the U.S. university women who comprised the Mid-West Universities Consortium for International Agriculture/Women in Development group (MUCIA/WID), worked from the U.S. side to ensure attention to gender issues. Building on contacts made during a prior conference on the Caribbean hosted by the University of Minnesota, members of MUCIA/WID received funding from AID's WID office and the AID Caribbean Regional office to carry out the baseline studies on St. Lucia and St. Vincent referred to earlier. An evaluation of the CAEP I project pointed to several implementation constraints to reaching the objective of better directing project resources towards the accomplishment of WID goals in the Eastern Caribbean. Sited were the project's erroneous implementation assumptions which included: 1) a belief that taking a "farm family" approach automatically addresses gender issues appropriately, when in actuality it often obscures women's real economic participation in small farm households; 2) although the WID component of the project emphasized awareness and sensitivity to women's needs, it did not sufficiently link them to the project's primary activities; and, 3) the criteria put forth for evaluating the success of the project failed to address the relationship of gender issues to the accomplishment of project objectives.

The evaluation also noted a clear gender division of labor in agriculture. Men's contribution to farming was primarily in land preparation, planting, and pest control. Women participated most in weeding, fertilizing, harvesting, storage and marketing. In households with animals, women also cared for livestock. On St. Lucia, women spent an average of five hours a day in farm work and an additional 8-10 hours a day on housework, child care and marketing trips to town. Women alone did the marketing in 37% of the households surveyed. They were the sole decision makers on 12% of the farms in St. Lucia and 23% in St. Vincent; while they made decisions jointly with the male partner in 50% of the farms on St. Lucia and 80% on St. Vincent.

Nevertheless, women's access to agricultural services (e.g. credit and extension services) was found to be disproportionate to their heavy involvement in agriculture. In St. Lucia, women received only 8% of the agricultural loans and less than 1% of the total amount dispersed. Only 15% of the women had received information from an extension worker. Women's relatives were cited as their main source of agricultural advice (51%).

AREP Actions

To address the previously identified constraints to the involvement of women and the direction of project resources to alleviate and resolve problem areas, the AREP envisions a series of project events, designed in conjunction with WID programs, for the accomplishment of project objectives. The project will undertake a baseline study of women's role in agriculture. Based on the outputs of this study, the project will help finance training and workshops to raise the awareness of research and extension staffs regarding women's roles in agriculture. Essential to this process will be an improved system for the collection and analysis of data. The data will be disaggregated according to gender and used directly in the planning and implementation of ongoing and new project activities.

The AREP project service delivery mechanism at the on-farm level will incorporate the multiple aspects of the relationship between gender and agriculture. For example, the project will focus specifically on making linkages between WID activities and the accomplishment of project objectives. The Women and Development Unit (WAND) of the Extra-Mural Department of the University of the West Indies, the UWI/WID office, and the Caribbean Feminist Research Association (CAFRA), located in Trinidad, will be called upon to collaborate and carry out a number of workshops and seminars to be financed under the project (and with other funding sources) for the benefit of the project's target population. In addition, whenever appropriate, pilot efforts experimenting with different delivery mechanism will be tried in one or more communities to provide gender-specific resources and support materials. Project sites will be selected in collaboration with the Caribbean Network for Integrated Rural Development (CNIRD), to incorporate an integrated community development effort involving multidisciplinary teams from CARDI, CARDATS, UWI Extension and WID groups.

The project contemplates the hiring of a WID coordinator (most likely to be a dual role performed by the project Agricultural Economist located organizationally in CARDI), to work with UWI, CARDI and the three WID groups.

Moreover, a WID advisory committee will be formed for the AREP project to be comprised of CARDI staff; UWI Extension personnel; the UWI/WID office; WAND; CAFRA and RDO/C. For the project's mid-term evaluation, the WID component and corresponding activities will be assessed as a priority item in the scope of work.

D. Institutional Analysis

With the exception of the Windward Islands Banana Grower's Association (WINBAN) and the West Indian Cane Breeding Station (WICBS) in Jamaica, the Caribbean Agricultural Research and Development Institute (CARDI) provides the only viable research presence in the OECS countries.

The Department of Extension, Faculty of Agriculture, University of the West Indies has a proven record of professional competence and success in professionalizing the national agricultural extension services in the OECS.

Each has become a proven institution in its own right. However, in terms of contribution to OECS agriculture, the sum of the two institutions is greater than a mere addition of two parts. The real issue is whether the two institutions can work together to integrate the research and extension functions in the OECS region -- a stiff challenge in any region of the world. The project is attempting to facilitate this interaction by:

- o Providing funding to support the respective programs of the two institutions.
- o Providing funding to facilitate linkage of joint planning and implementing of programs.
- o Holding the two institutions jointly accountable for achievements/accomplishments, many of which require working together.

The Caribbean Agricultural Research and Development Institute (CARDI)

CARDI -- established in 1975 to serve the agricultural research needs of the Member States of the Caribbean community -- is the only research institution effectively serving the OECS countries.

CARDI's evolution since 1975 can be divided into three phases. During the establishment phase (1975-78), the Institute concentrated on maintaining the high quality of adaptive research capacity it inherited from its predecessor. The main research activities were then carried out at CARDI headquarters in Trinidad with small units in Jamaica and Barbados.

The decentralisation phase (1979-86) involved steady growth to meet a wider range of problems from member countries and an increased emphasis on small farmers and domestic crops. During this phase, CARDI established an active research program with scientists working in all member states, and with the help of external funding (primarily from USAID), embarked on a major program using the farming systems methodology.

The current phase is one of consolidation to more effectively address the needs of member states. This stage involves identifying and overcoming weaknesses in the Institution, better focusing the research efforts to achieve greater impact, and establishing linkages with other institutions to strengthen the region's capacity to carry out quality research. Several key steps have characterized the transition to this phase:

- o The Standing Committee of Ministers of Agriculture appointed a new Executive Director for the Institute; he has subsequently been reappointed for a second term.
- o The Heads of Governments mandated that the Caribbean Agricultural and Rural Development Advisory and Training Service (CARDATS) project, funded by UNDP, be integrated into the operations of CARDI. Proposals for the integration of CARDATS into CARDI have been prepared and implementation plan is being developed.
- o A Strategic Plan, which will ensure the long term viability of the Institute, has been accepted by the Board of Directors of the Institute, and is being implemented. It has the following main characteristics:
 - ** Multi-country problems, including much of the more generalized animal and crops research, are resolved through collaborative research networks, linking the IARCs and other sources of improved germplasm.

** Country-specific problems are resolved through country-programs, utilizing a farming systems approach.

** Research objectives and program criteria determine the priorities assigned to activities in the three CARDI program areas -- Crop Production, Animal Production, and the Integrated Development Program.

- Crop production will emphasize:
 - Grain legumes (cow peas, red peas, peanuts, pigeon peas)
 - Root crops (sweet potatoes, yams, tannias, and dasheens)
 - Vegetables (tomatoes, onions, cabbages, sweet peppers)
 - Tree crops (mango, avocado, papaya, pineapple)
 - Flowers & ornamentals (anthurium, heliconia, orchids)

Primary research is in:

- Improvement of cultivars
 - Pest and disease control
 - Improved harvesting methods
 - Post harvest handling
- Animal production will emphasize:
 - Selection and evaluation of forages
 - Production of forage seeds
 - Regional sheep and goat development (selection and breeding)
 - Technology adaptation and transfer will emphasize:
 - Testing and validation of improved production packages at farm level
 - Development of production systems to integrate crop and animal production components
 - Preparation of fact sheets for extension staff and farmers.

A structural re-organization and management plan for the Institute was prepared, endorsed by the Heads of Governments, and is being implemented.

** Operations are fully decentralized with a program of work and personnel in each of the 12 countries

- ** Program leaders have been appointed for each of the three program areas
- ** Subject matter specialists have been appointed and decentralized
- ** Technical backstopping has been established in key areas; e.g., biometrics, economics, and documentation
- ** A matrix-management plan has been adopted as best suited to coordinate the regionally-dispersed range of operations
- ** Project leaders have been appointed for each donor-funded project who will be accountable for respective areas of performance
- ** A Planning, Monitoring, and Evaluation Unit has been established
- ** At the Administrative Office, three key new appointments have been made:
 - Human Resource and Development Officer
 - Professional Accountant
 - Internal Auditor
- ** A compensation package has been developed which removes the inequities which hitherto existed
 - Staff appraisal system introduced
 - Accounting systems and procedures vastly improved
 - Operations now subject to regular internal audits
- ** CARDATS is being integrated at the senior management and country administrative levels
- ** CARDI is operating on a unified work program which is reflected in an annual planning schedule outlined in the Strategic Plan
- o Organizational and operational principles in restructuring included:
 - ** At least one professional and one technical staff located in each member country paid from core budget
 - ** Core budget of not more than EC\$7.6 million

** Personnel:operating cost ratio not to exceed 70:30
Based on all of the above, i.e., the strategic plan
and the organizational and operational restructuring
guidelines, CARDI was able to streamline its operation
through consolidation by:

** Reducing professional staff (this does not
include CARDATS staff as they are paid by UNDP
until 1990) from 42 to 36 and

** Reducing support staff from 70 to 62, thereby

** Reducing personnel costs from EC\$6 million (80%)
to EC\$4.56 million (70%) and

** Increasing operating costs (for travel and
research equipment and expenses) from EC\$1.6
million (22%) to EC\$1.9 million

- o Member Governments are making good their financial commitments to the Institute. (see Annex J).
- o An informal donor support group, composed of the major donors supporting and interested in CARDI, has been organized and is holding regular meetings.
- o An agreement for core budget contribution and technical collaboration is being negotiated with the Inter-American Institute for Cooperation in Agriculture (IICA).

CARDI has addressed in a positive way almost all of the recommendations of the most recent USAID project evaluation, and CARDI is now well-poised to play a significant role in meeting the research and development needs of its client states.

This Project will have its administrative center in St. Lucia and will assume the administrative structure of the CARDI: FSRD Project (538-0099). The structure and staffing have been reviewed by the RDO/C Controller's Office and found to be adequate for Project needs.

Agricultural Extension in the Eastern Caribbean

In contrast to agricultural research, each of the OECS countries has an extension system. However, until creation of the Caribbean Agricultural Extension Project (CAEP) with the assistance of AID and the University of the West Indies, none of the member state extension systems could have been characterized as operating effectively. CAEP can also be characterized as having gone through three phases of development.

During the first phase (1980-82), institutional analyses were carried out on the agencies and actors which had an impact on national extension systems in the OECS (and Belize). The analyses indentified weaknesses and strengths of the extension systems and provided profiles of the levels of skills and training, administrative and supervisory procedures, communication resources, and technical backstopping available to the national extension systems. National extension improvement plans were designed to overcome constraints and deepen strengths so that the extension systems could make more efficient use of resources, whether human or otherwise, for more effective impact at the farm level.

During the second phase (1982-85), improvement plans were implemented with particular reference to:

- o Structural re-organization, role specification, and motivation.
- o Training and professional development, both formal and informal.
- o Communication resources for mobility and information dissemination.
- o UWI backstopping.

During the third phase (1985-present), the farm/home management approach based on a farming systems perspective was initiated. Selected extension districts were chosen to be demonstrations of how an effective and efficient extension system can operate at the district level without extra inputs, rather by utilizing an optimum resource management approach. Multidisciplinary teams, composed of professionals from CARDI, CARDATS, CFNI, ministries, MUCIA universities, and UWI faculty of agriculture (including CAEP) staff conducted rapid reconnaissance surveys (sondeos) in each district. Major accomplishments included:

- o Intensive first-hand acquaintance with farmers' problems, needs, and resources by researchers, ministry administrators, and front-line extension workers.
- o Training of UWI researchers and colleagues of regional institutions in farming systems research and extension (FSR/E) methodology.

- o Increased awareness of the need for closer interfacing between research, extension, and training at all levels.
- o Design of relevant plans of work by district extension staff with participation of farmers and a variety of resource persons.
- o Design, production, and testing of a 75-minute slide-set communication package which has been used as a training device for extension needs assessment exercises.

Adoption of a farm management approach to extension program planning and execution has required special training at the district level in farm management principles and techniques. This enables the educational work of the front-line staff to emphasize economic factors for rational decision-making of optimum use of resources by the farm as an enterprise and for the benefit of the farm household as a whole entity. The response of extension staff to their role as resource manager/adviser to farm families has been highly encouraging to date. The demands by the farmers for better planning, adequate consultation, and timely provision of relevant services has also stimulated the need for better professionalism on the part of front-line extension workers.

On-going training by farm management extension professionals, the use of group approaches, and a variety of mass media techniques as well as reference manuals, and the reliance on resource-persons and back-up support by national communication units, are clearly in great demand, thereby consolidating and institutionalizing the efforts at reorganizing national extension services.

CAEP, under the leadership of the Department of Extension at the University of the West Indies (UWI) can note several significant accomplishments:

- o A Regional Agricultural Extension Coordinating Committee (RAECC) has been established as a critical forum to exchange information and assist in decision-making on policies for the improvement of effectiveness of extension services. The unique contribution of RAECC is its composition which includes Chief Agricultural Officers and Heads of Extension from the Ministries of participating countries, farmers' representatives, professionals from regional organizations such as CARDI/CARDATS,

CFNI, CARICOM Secretariat, the OECS Secretariat, IICA, representatives from funding agencies, MUCIA, the UWI, and CAEP staff.

- o National committees have been formed in each member state to determine extension priorities.
- o Two full-time UWI extension specialists have been located in the OECS countries to be responsible for coordinating Windwards and Leewards Islands national extension improvement programs. The windwards position is funded from the UWI core budget. UWI has agreed to provide core funding for the leewards position, in year 4 of the Project.
- o Farmer education has become the primary function and focus of national extension services, virtually eliminating regulatory functions by extension services and significantly reducing other service functions.
- o The home/farm management approach has been initiated as a primary extension strategy; extension agents have carried out this approach with approximately 150 farm units in the region.
- o An annual plan of work and program development cycle has been introduced into the national agricultural extension services, making extension services more coherent, focused, and aimed at identifying priorities for agricultural development.
- o Supervision of extension staff, particularly through the upgrading of skills at the middle-management level by means of the Diploma in Education program, has increased and become more effective.
- o Training of front-line staff has been strengthened by periodic workshops on subject matter as well as technique information.
- o National extension communication units have been established, staff have been trained in a variety of communications methods, and audio visual equipment and vehicles have been provided through project funding.
- o The technical capability of the Regional Extension Communications Unit (RECU) at UWI has been significantly upgraded for production and distribution of a range of communications materials and training. Particularly important accomplishments include:

- ** Publication of a Caribbean Agricultural Extension Manual as a loose-leaf reference manual with Extension Fact Sheets on more than 100 topics along with a Program Planning Guide.
 - ** Design and introcution of a Farm and Home Management Notebock covering such topics as principles of partial budgeting, whole farm planning, record-keeping, etc..
 - ** A pre-recorded cassette radio series called Agricultural Reports distributed to national radio stations for broadcast of interviews with agricultural researchers on new technologies.
 - ** Instructional material in slide-set series with audio commentaries dealing with topics on soil and water conservation, budding and grafting of citrus, sheep and rabbit production, etc..
 - ** Plans for training in the production of instructional television programming, including production of a series of video productions.
- o Outstanding extension agents are being recognized with Excellence in Extension Awards.

As a result of the CAEP project and UWI backstopping, a concensus has developed about what extension should be. The conclusion of the midterm 1984 CAEP evaluation was that "The island extension services have been largely transformed, from their previous unfocused, ineffective state into well organized, potentially highly effective systems."

Sustainability Issues

Research

It is apparent that CARDI is committed to its diversification plans and that it will make every effort to sustain these activities after the Project has ended. An analysis of expenditures required to maintain activities after the PACD shows a total of \$423,000 per year which CARDI will have to assume. This amount is made

up of personnel, \$236,000; supplies, \$10,000; meetings, \$53,200; and technical collaboration, \$50,000. The analysis also shows a CARDI core budget of \$2,732,000 for 1988/89 with the approval of member states for this to rise to \$3,796,000 by 1993. This rise does not take into account a CARDI agreement with IICA in which IICA has agreed to provide 10% of the CARDI core budget with the total amount not to exceed \$300,000 per year. Even considering a 5% per year inflation factor in CARDI personnel costs, it is clear that CARDI will have ample resources to sustain project activities after the PACD.

Extension

On the extension side it is less clear how many of the activities need to be sustained since much of the resources go to longterm training or if they will be sustained by OECS countries. What is clear is that UWI is assuming the Leeward extension specialist and the communications coordinator in year 4 of the Project. The University has already established the positions in both cases and is budgetting the required resources beginning in those years. The training, travel and supplies portions of the extension budget which should be sustained total \$127,000 per year and will have to be covered by OECS countries after the Project has ended.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 89 to FY 93
Total U.S. Funding: \$5.0 million
Date Prepared: 1/18/89

Project Title & Number: Development of Agricultural Research and Extension in the Eastern Caribbean (538-0164)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
GOAL:			
To Improve productive efficiency of agricultural sectors in OECS countries in order to:			1. International economic conditions, policies, and markets do not worsen.
1. Maintain, and to the extent possible raise incomes and food consumption of the rural poor.	- Gross domestic product from agriculture increases faster than population with broad distribution.	1. ENP statistics. 2. Agricultural statistics. 3. Farmer surveys.	2. Foreign Exchange rates do not strengthen appreciably.
2. Stabilize foreign exchange earnings/savings from agriculture.	- Food consumption per capita increases. - Imports minus exports of agricultural product decreases.	1. Trade statistics.	3. OECS country economic and political conditions and policies do not worsen (domestic markets are maintained)
3. Maintain and enhance the natural resource base.			4. Input (credit, seeds, fertilizers, chemicals farm implements) availability and distribution grows with response to demand. 5. Weather is average.
PURPOSE:			
- To strengthen institutional capability of regional research and extension organizations to generate, adopt and disseminate continuing streams of improved agricultural technological (varieties/species and management practices) for the benefit of farmers of the region.	<p>End of Project Status:</p> <ul style="list-style-type: none"> - CARDI is producing a continuing stream of improved technologies over a diversified range of commodities. - UWI is working effectively with CARDI and Minister of Agriculture to foster an effective extension function. - 10% of farmers in the OECS countries have adopted improved technologies. - 10% of farmers in the OECS countries participate in farm management planning activities (directly or indirectly). - CARDI is core-funding the technology adaptation program. - UWI is funding from regular budget extension specialists for Windward and Leeward Islands and Communication Coordinator. - CARDI and Extension Department of UWI collaborating effectively. - OECS countries providing expected policy and funding support. - Donor collaborative grant formed and donors providing adequate funding (meets regularly in Barbados and CGIAR) 	<ul style="list-style-type: none"> 1. CARDI and OECS reports. 1. UWI, CARDI and OECS reports. 1. Farmer surveys CARDI/UWI reports. 1. Farmer surveys CARDI/UWI reports. 1. CARDI reports. 1. UWI reports. 1. CARDI and UWI reports. 1. CARDI reports. 1. CARDI reports. 	<p>PURPOSE</p> <ul style="list-style-type: none"> 1. The IARCs and CRSPs continue to be effective generators of improved technologies. 2. CARDATS is effectively integrated into CARDI. 3. CARDI and UWI overcome historical differences. 4. OECS countries are economically healthy. 5. UWI budget situation improves. 6. Donor assistance levels continue to increase normally.

NARRATIVE SUMMARY	OBJECTIVE, VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<u>OUTPUTS</u>	<u>MAGNITUDE OF OUTPUTS</u>		<u>OUTPUTS ASSUMPTIONS</u>
<u>Technology generation</u> 1. More effective technology adaptation at farm level. 2. More effective commodity networks.	- Technology adaptation (FSR/E) methodology refined and implemented. - 150 on-farm tests per year - 4 collaborative research networks (Coordinators, steering committees annual meetings, IARCs participating tasks assigned others)	1. CARDI reports 1. CARDI reports 1. UWI reports	
<u>Technology transfer/dissemination</u> 3. More effective interaction among extension workers and farmers.	- Increasing number of varieties and practices recommended over a range of commodities. - Farm management methodology refined and implemented. - Increasing number of farmers using farm management record keeping.	1. CARDI reports	
<u>Institution Building</u> 4. Better trained staff. 5. More effective management. 6. More effective two-way communication among research extension, UWI, farmers, and policy makers.	- Increase in # CARDI staff with PhD - Increase in Extension staff with diploma - 20 CARDI and Extension staff participating in subject matter workshops. - CARDI carrying out 5-year strategy - UWI and Ministries carrying out 1988 CAEP Evaluation recommendations - continuing linkages with U.S. institutions.	1. CARDI reports 2. UWI reports 3. Country reports 1. CARDI annual reports	

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<u>INPUTS</u>	<u>(Project Costs)</u>					<u>Preconditions</u>
	<u>AID</u>	<u>CARDI</u>	<u>UWI</u>	<u>Other Donors</u>	<u>OECS</u>	
<u>Technical Staff</u>	1,334.3	1,850.0	1,200.0	500.0	500.0	1. CARDI and UWI agree to composition of Coordinating Committee.
Communications Coordinator						
Extension Specialist (Leeward Islands)						
Extension Specialist (Windward Islands)						
Technology Adaptation Spec. (AID 4; CARDI 3)					500.0	
Crop Diversification						
<u>Support Staff</u>	400.0					2. Subcontract from CARDI to UWI gives Department of Extension responsibilities for travel, etc of staff.
<u>Research/Training Center</u>	250.0	0.0	0.0	200.0	200.0	
<u>Equipment and Supplies</u>	413.5	175.0	100.0		0.0	
<u>Research Expenses</u>	359.3	200.0	50.0		0.0	
<u>Travel</u>	581.0	180.0	10.0	10.0	10.0	
<u>Workshops and Training</u>	746.5	100.0	100.0	400.0	400.0	4. Other donors fund pomologist, post harvest technologist
<u>Technical Collaboration</u>	450.4	0.0	0.0		0.0	
<u>OH and Contingency</u>	365.0	0.0	0.0		0.0	
<u>AID Direct Contract</u>	100.0	0.0	0.0		0.0	
TOTAL:	<u>5,000.0</u>	<u>2,505.0</u>	<u>1,460.0</u>	<u>1,110.0</u>	<u>1,110.0</u>	

2146b (p 7&8)

October 27, 1988

ACTION MEMORANDUM FOR THE MISSION DIRECTOR, RDO/C

FROM: Douglas A. Chiriboga, Acting Chief ^{PC} PDO

SUBJECT: Development of Agricultural Research and Extension in the Eastern Caribbean (DAREEC) PID (538-0164)

Action: You are requested to approve the Project Identification Document for the Development of Agriculture Research and Extension in the Eastern Caribbean (DAREEC) (538-0164).

Discussion: The subject PID is a proposed \$5.0 million effort to strengthen the institutional capability of regional research and extension organizations to generate, develop, adapt and disseminate continuing streams of improved agricultural technologies. It provides core support to the Caribbean Agricultural Research and Development Institute (CARDI) and assists the Extension Department of the University of the West Indies to strengthen OECS extension services.

The PID was reviewed by the Mission on October 20, 1988. Attached is the review Issues Agenda along with the discussion and conclusion(s) or recommendation(s) on each issue. Major conclusions of the review are:

1. The project meets the criteria for grant financing and therefore will be grant financed.
2. The timely provision of adequate counterpart contributions will be made a condition precedent to disbursement of project funds.
3. The integration of CARDATS into CARDI will be made a condition precedent to disbursement of project funds.
4. The PID will include brief statements on lessons learned from the CARDI: Farming Systems Research and Development Project (538-0099) and the Caribbean Agricultural Extension Project (638-0068) and on Women in Development.
5. The project paper will include a description of mechanisms for integrating research and extension; a discussion of a process for identifying research priorities; a description of the bottlenecks in the extension system; the identification of areas where the private sector could be effective in agricultural research and extension; economic and financial analyses based on Handbook 3 methodology and activities to deal with such environmental concerns as pesticide use and safety and pesticide residues.

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Attached is the revised PID which includes the changes requested above and which responds to the marginal comments of the individual reviewers.

The PID includes a copy of the Initial Environmental Examination (IEE) (Annex D) which was faxed to AID/W for the concurrence of the Bureau Environmental Officer. The Mission has been informed by State cable No. 364822 (attached) that the IEE was signed on November 8, 1988. As soon as a signed copy of the IEE is received, it will be attached to the PID.

Authority: RDO/C requested AID/W authority to approve the subject PID in the 1989 Annual Action Plan submission. Authority to approve the project at a \$2.5 million level was granted to the Mission in State cable 163632 dated May 21, 1988.

The attached cable informs AID/W that we have approved the PID at the \$5.0 million level and requests AID/W authorization to approve the project paper at that level.

Recommendation: That you approve the subject PID by signing the attached PID face sheet.

Clearances:

ADO:JAS	teeper	(draft)	Date 11/02/88
C/ARDO:LK	Laird	<i>LKL</i>	Date <u>11/10/88</u>
A/C/PRM:RG	Grohs	(draft)	Date 11/02/88
RLA:R	Johnson	(draft)	Date 11/08/88
CONT:TFF	allon	(draft)	Date 11/07/88
A/L/DIR:KF	Finan	<i>KF</i>	Date <u>11/10/88</u>

Drafted:TJMiller:aaw 10/27/88 Doc.2165b P13-14.
Revised TJMiller:aaw 11/01/88

AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT IDENTIFICATION DOCUMENT
FACESHEET (PID)

1. TRANSACTION CODE **A** Revision No. _____
 A = Add
 C = Change
 D = Delete
 DOCUMENT CODE 1

2. COUNTRY/ENTITY
Regional Development Office/Caribbean

3. PROJECT NUMBER
538-0164

4. BUREAU/OFFICE
 A. Symbol _____ B. Code 05
Latin America/Caribbean LAC

5. PROJECT TITLE (maximum 40 characters)
Development of Agricultural Research & Extension in the Eastern Caribbean

6. ESTIMATED FY OF AUTHORIZATION/OBLIGATION/COMPLETION
 A. Initial FY 8/9
 B. Final FY 9/3
 C. PACD 9/4

7. ESTIMATED COSTS (\$000 OR EQUIVALENT, \$1 =)

FUNDING SOURCE		LIFE OF PROJECT
A. AID		5,000
B. Other U.S.	1.	
	2.	
C. Host Country		5,100
D. Other Donor(s)		
TOTAL		10,100

8. PROPOSED BUDGET AID FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. 1ST FY		E. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) ARDN	120	080		1,300		5,000	
(2)							
(3)							
(4)							
TOTALS							
				1,300		5,000	

9. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)
012 070 _____ _____ _____ _____

10. SECONDARY PURPOSE CODE
110

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

A. Code	R/AG	TECH
B. Amount	<u>3000</u>	<u>3,000</u>

12. PROJECT PURPOSE (maximum 480 characters)

To strengthen the institutional capability of regional research and extension organizations to generate, develop, adapt and disseminate continuing streams of improved agricultural technologies (varieties/species and management practices).

13. RESOURCES REQUIRED FOR PROJECT DEVELOPMENT

Staff: PD&S Funded Project Design Specialist and Agricultural Economist	7 weeks
Mission Staff	14 weeks
AID/W Staff	3 weeks
CARDI and UWI Staff	4 weeks
Funds \$30,000 PD&S	

14. ORIGINATING OFFICE CLEARANCE

Signature: James S. Holtaway
 Title: James S. Holtaway Director
 Date Signed: 11/10/88 MM DD YY

15. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID W/DOCUMENTS, DATE OF DISTRIBUTION
 MM DD YY

16. PROJECT DOCUMENT ACTION TAKEN

S = Suspended CA = Conditionally Approved
 A = Approved DD = Decision Deferred
 D = Disapproved

17. COMMENTS

18. ACTION APPROVED BY

Signature: _____
 Title: _____

19. ACTION REFERENCE

20. ACTION DATE
 MM DD YY

ACTION AID-1 INFO CDA CHRON

VZCZCWN0748
PP RUEBWN
DE RUEEC #9852 0312059
ZNR UUUUU 2ZH
P 312058Z JAN 89
FM SECSTATE WASHDC
TO AMEMBASSY BRIDGETOWN PRIORITY 5149
BT
UNCLAS STATE 029852

LOC: 013 758
31 JAN 89 2055
CN: 19711
CHPG: AID
DIST: AID

01 FEB 1979

AIDAC

E.O. 12356: N/A

TAGS:

SUBJECT: AGRICULTURAL RESEARCH AND EXTENSION PROJECT
(53F-0154)

REF: 88 BRIDGETOWN 09665

1. APOLOGIZE FOR THE DELAY IN RESPONDING TO REFTEL.
2. RE PARA 2M, REFTEL, BUREAU APPROVES INCREASE IN SUBJECT PROJECT'S FUNDING LEVEL FROM DOLS 2.5 MILLION TO DOLS 5 MILLION.
3. IN ORDER TO COMPLETE CN PLEASE PROVIDE DETAILS ON THE FOLLOWING AS SOON AS POSSIBLE:
 - (A) PROJECT BACKGROUND;
 - (B) BENEFICIARIES;
 - (C) A.I.D. FINANCED INPUTS;
 - (D) ESTIMATED PROJECT COMPLETION DATE; AND
 - (E) ESTIMATED DATE OF FINAL OBLIGATION BAKER

BT
#9852

NNNN

ACTION <i>A/R</i>	
	INFO
DIR	
D/DIR	
EXO	
RLA	
RCO	
PO	
PO/ED	
PO/	
COMT	
POD	<i>J. Chirgo</i>
PSD	
HPE	
INFFA	
A/RD	
JAO	
CC	
DUE:	<i>02/26/89</i>
TAKEN:	
SIGN:	
NO:	



21 JUN 1988

CARDI Annex C Page 1 of 28/670 509

CARIBBEAN AGRICULTURAL RESEARCH AND DEVELOPMENT INSTITUTE
UNIVERSITY CAMPUS - ST. AUGUSTINE - TRINIDAD, W. I.

Cables: "CARDINST"
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Port of Spain
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A/Ro

June 9, 1988

Our Reference: CT 3/2

Mr. James Holtaway,
Director,
USAID, Regional Development Office (Caribbean),
P.O. Box 302,
Bridgetown,
BARBADOS

R. Juan
NAN
OAS 6/22/88
dhramp
07/01/88

Dear Sir:

Re: Agricultural Research Extension and Development Project
- Submission of Project Identification Document (PID) 060919

The Project Assistance Completion Date (PACD) of the current Farming Systems Research and Development Project #538-0099 is September 30, 1988. We are therefore, submitting the enclosed Project Identification Document (PID) for a new project entitled: Agricultural Research Extension and Development Project.

The proposed project was designed jointly by CARDI and UWI and is to be executed in such a manner that firm linkages between research and extension in the Eastern Caribbean will be consolidated and strengthened.

The proposal has received the endorsement of the Board of Governors of CARDI (the Ministers of Agriculture) at their recently concluded meeting held in Trinidad, May 26-28, 1988. I should draw to your attention that the Ministers requested that the level of funding being sought should be that indicated in this Project Identification Document (PID), rather than that proposed by Mr. Larry Laird in his presentation at the Meeting.

In addition, we would ask that the Project Assistance Completion Date of the current FSR/D Project be extended to December 1988, to allow a smooth transition into the proposed new project.

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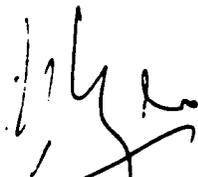
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We sincerely hope that you will give active and favourable consideration to our requests and stand ready to answer any queries you may have.

With best wishes.

Yours sincerely,



Derrick Dyer
Executive Director

cc: Dep. Executive Director (Research Development)

5C(1) - COUNTRY CHECKLIST

Listed below are statutory criteria applicable to: (A) FAA funds generally; (B)(1) Development Assistance funds only; or (B)(2) the Economic Support Fund only.

A. GENERAL CRITERIA FOR COUNTRY ELIGIBILITY

- | | |
|--|------|
| 1. <u>FY 1989 Appropriations Act Sec. 578(b).</u>
Has the President certified to the Congress that the government of the recipient country is failing to take adequate measures to prevent narcotic drugs or other controlled substances which are cultivated, produced or processed illicitly, in whole or in part, in such country or transported through such country, from being sold illegally within the jurisdiction of such country to United States Government personnel or their dependents or from entering the United States unlawfully? | No. |
| 2. <u>FAA Sec. 481(h); FY 1989 Appropriations Act Sec. 578; 1988 Drug Act Secs. 4405-07.</u> (These provisions apply to assistance of any kind provided by grant, sale, loan, lease, credit, guaranty, or insurance, except assistance from the Child Survival Fund or relating to international narcotics control, disaster and refugee relief, narcotics education and awareness, or the provision of food or medicine.) If the recipient is a "major illicit drug producing country" (defined as a country producing during a fiscal year at least five metric tons of opium or 500 metric tons of coca or marijuana) or a "major drug-transit country" (defined as a country that is a significant direct source of illicit drugs significantly affecting the United States, through which such drugs are transported, or through which significant sums of drug-related profits are | N/A. |

laundered with the knowledge or complicity of the government): (a) Does the country have in place a bilateral narcotics agreement with the United States, or a multilateral narcotics agreement? and (b) Has the President in the March 1 International Narcotics Control Strategy Report (INSCR) determined and certified to the Congress (without Congressional enactment, within 45 days of continuous session, of a resolution disapproving such a certification), or has the President determined and certified to the Congress on any other date (with enactment by Congress of a resolution approving such certification), that (1) during the previous year the country has cooperated fully with the United States or taken adequate steps on its own to satisfy the goals agreed to in a bilateral narcotics agreement with the United States or in a multilateral agreement, to prevent illicit drugs produced or processed in or transported through such country from being transported into the United States, to prevent and punish drug profit laundering in the country, and to prevent and punish bribery and other forms of public corruption which facilitate production or shipment of illicit drugs or discourage prosecution of such acts, or that (2) the vital national interests of the United States require the provision of such assistance?

3. 1986 Drug Act Sec. 2013; 1988 Drug Act Sec. 4404. (This section applies to the same categories of assistance subject to the restrictions in FAA Sec. 481(h), above.) If recipient country is a "major illicit drug producing country" or "major drug-transit country" (as defined for the purpose of FAA Sec 481(h)), has the President submitted a report to Congress listing such country as one (a) which, as a matter of government policy, encourages or facilitates the production or distribution of illicit drugs; (b) in which any senior official of the

No.

- government engages in, encourages, or facilitates the production or distribution of illegal drugs; (c) in which any member of a U.S. Government agency has suffered or been threatened with violence inflicted by or with the complicity of any government officer; or (d) which fails to provide reasonable cooperation to lawful activities of U.S. drug enforcement agents, unless the President has provided the required certification to Congress pertaining to U.S. national interests and the drug control and criminal prosecution efforts of that country?
4. FAA Sec. 620(c). If assistance is to a government, is the government indebted to any U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies, (b) the debt is not denied or contested by such government, or (c) the indebtedness arises under an unconditional guaranty of payment given by such government or controlled entity? No.
5. FAA Sec. 620(e)(1). If assistance is to a government, has it (including any government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? No.
6. FAA Secs. 620(a), 620(f), 620D; FY 1989 Appropriations Act Secs. 512, 550, 592. Is recipient country a Communist country? If so, has the President determined that assistance to the country is vital to the security of the United States, that the recipient country is not controlled by the international Communist conspiracy, and that such assistance will further promote the independence of the recipient country from international communism? Will assistance be provided No.

either directly or indirectly to Angola, Cambodia, Cuba, Iraq, Libya, Vietnam, South Yemen, Iran or Syria? Will assistance be provided to Afghanistan without a certification, or will assistance be provided inside Afghanistan through the Soviet-controlled government of Afghanistan?

7. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, damage or destruction by mob action of U.S. property? No.
8. FAA Sec. 620(l). Has the country failed to enter into an investment guaranty agreement with OPIC? No.
9. FAA Sec. 620(o); Fishermen's Protective Act of 1967 (as amended) Sec. 5. (a) Has the country seized, or imposed any penalty or sanction against, any U.S. fishing vessel because of fishing activities in international waters? (b) If so, has any deduction required by the Fishermen's Protective Act been made? No.
10. FAA Sec. 620(q); FY 1989 Appropriations Act Sec. 518. (a) Has the government of the recipient country been in default for more than six months on interest or principal of any loan to the country under the FAA? (b) Has the country been in default for more than one year on interest or principal on any U.S. loan under a program for which the FY 1989 Appropriations Act appropriates funds? No.
11. FAA Sec. 620(s). If contemplated assistance is development loan or to come from Economic Support Fund, has the Administrator taken into account the percentage of the country's budget and amount of the country's foreign exchange or other resources spent on military equipment? (Reference may be made to the annual "Taking Into Consideration" memo: "Yes, taken into account by the Administrator at time of approval of N/A.

Agency OYB." This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)

12. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have relations been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? No.
13. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the A.I.D. Administrator in determining the current A.I.D. Operational Year Budget? (Reference may be made to the "Taking into Consideration" memo.) OECs countries are in arrears on U.N. obligations.
Yes.
14. FAA Sec. 620A. Has the President determined that the recipient country grants sanctuary from prosecution to any individual or group which has committed an act of international terrorism or otherwise supports international terrorism? No.
15. FY 1989 Appropriations Act Sec. 568. Has the country been placed on the list provided for in Section 6(j) of the Export Administration Act of 1979 (currently Libya, Iran, South Yemen, Syria, Cuba, or North Korea)? No.
16. ISDCA of 1985 Sec. 552(b). Has the Secretary of State determined that the country is a high terrorist threat country after the Secretary of Transportation has determined, pursuant to section 1115(e)(2) of the Federal Aviation Act of 1958, that an airport in the country does not maintain and administer effective security measures? No.

17. FAA Sec. 666(b). Does the country object, on the basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. who is present in such country to carry out economic development programs under the FAA? No.
18. FAA Secs. 669, 670. Has the country, after August 3, 1977, delivered to any other country or received nuclear enrichment or reprocessing equipment, materials, or technology, without specified arrangements or safeguards, and without special certification by the President? Has it transferred a nuclear explosive device to a non-nuclear weapon state, or if such a state, either received or detonated a nuclear explosive device? (FAA Sec. 620E permits a special waiver of Sec. 669 for Pakistan.) No.
19. FAA Sec. 670. If the country is a non-nuclear weapon state, has it, on or after August 8, 1985, exported (or attempted to export) illegally from the United States any material, equipment, or technology which would contribute significantly to the ability of a country to manufacture a nuclear explosive device? No.
20. ISDCA of 1981 Sec. 720. Was the country represented at the Meeting of Ministers of Foreign Affairs and Heads of Delegations of the Non-Aligned Countries to the 36th General Assembly of the U.N. on Sept. 25 and 28, 1981, and did it fail to disassociate itself from the communique issued? If so, has the President taken it into account? (Reference may be made to the "Taking into Consideration" memo.) No.
21. FY 1989 Appropriations Act Sec. 527. Has the recipient country been determined by the President to have engaged in a consistent pattern of opposition to the foreign policy of the United States? No.

22. FY 1989 Appropriations Act Sec. 513. Has the duly elected Head of Government of the country been deposed by military coup or decree? If assistance has been terminated, has the President notified Congress that a democratically elected government has taken office prior to the resumption of assistance? No.
23. FY 1989 Appropriations Act Sec. 540. Does the recipient country fully cooperate with the international refugee assistance organizations, the United States, and other governments in facilitating lasting solutions to refugee situations, including resettlement without respect to race, sex, religion, or national origin? Yes.

10.

8. FUNDING SOURCE CRITERIA FOR COUNTRY ELIGIBILITY

1. Development Assistance Country Criteria

FAA Sec. 116. Has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, can it be demonstrated that contemplated assistance will directly benefit the needy?

No.

FY 1989 Appropriations Act Sec. 536. Has the President certified that use of DA funds by this country would violate any of the prohibitions against use of funds to pay for the performance of abortions as a method of family planning, to motivate or coerce any person to practice abortions, to pay for the performance of involuntary sterilization as a method of family planning, to coerce or provide any financial incentive to any person to undergo sterilizations, to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions or involuntary sterilization as a means of family planning?

No.

2. Economic Support Fund Country Criteria

FAA Sec. 502B. Has it been determined that the country has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, has the President found that the country made such significant improvement in its human rights record that furnishing such assistance is in the U.S. national interest?

N/A

FY 1989 Appropriations Act Sec. 578(d). Has this country met its drug eradication targets or otherwise taken significant steps to halt illicit drug production or trafficking?

N/A

Agricultural Research and Extension Project 538-0164
5C (2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A includes criteria applicable to all projects. Part B applies to projects funded from specific sources only: B(1) applies to all projects funded with Development Assistance; B(2) applies to projects funded with Development Assistance loans; and B(3) applies to projects funded from ESF.

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

A. GENERAL CRITERIA FOR PROJECT

1. FY 1989 Appropriations Act Sec. 523; FAA Sec. 634A. If money is sought to be obligated for an activity not previously justified to Congress, or for an amount in excess of amount previously justified to Congress, has Congress been properly notified?
A Congressional Notification will be sent forward and the waiting period will have expired prior to project authorization.
2. FAA Sec. 611(a) (1). Prior to an obligation in excess of \$500,000, will there be (a) engineering, financial or other plans necessary to carry out the assistance, and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?
Yes.
3. FAA Sec. 611(a) (2). If legislative action is required within recipient country, what is the basis for a reasonable expectation that such action will be completed in time to permit orderly accomplishment of the purpose of the assistance?
No action required.
4. FAA Sec. 611(b); FY 1989 Appropriations Act Sec. 501. If project is for water or water-related land resource construction, have benefits and costs been computed to the extent practicable in accordance with the principles, standards, and procedures established pursuant to the Water Resources Planning Act (42 U.S.C. 1962, et seq.)? (See A.I.D. Handbook 3 for guidelines.)
N/A

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and total U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability to maintain and utilize the project effectively? N/A
6. FAA Sec. 209. Is project susceptible to 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. This is a regional project and is strongly supportive of role of CARDI and UWI as important regional agricultural research, education and extension institutions.
7. FAA Sec. 601(a). Information and conclusions on whether projects 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) Project will support increased agricultural production for export. (b) Project will encourage private sector involvement in technology transfer process. (c) No. (d) N/A (e) Project supports generation, transfer and adoption of a wide range of agricultural technologies. (f) N/A.
8. FAA Sec. 601(b). Information and conclusions 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). Project will encourage US private participation in the foreign assistance program through US technical collaboration and procurement.
9. FAA Secs. 612(b), 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 in lieu of dollars. No U.S. locally owned currencies will be used. However, CARDI, UWI and host governments will contribute an estimated 50% of total 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.

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11. FY 1989 Appropriations Act Sec. 521. 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? No. Agricultural products developed for export are not in surplus nor are expected to be in the near future.
12. FY 1989 Appropriations Act Sec. 549. Will assistance (except for programs in Caribbean Basin Initiative countries under U.S. Tariff Schedule "Section 807," which allows reduced tariffs on articles assembled abroad from U.S.-made components) be used directly to procure feasibility studies, prefeasibility studies, or project profiles of potential investment in, or to assist the establishment of facilities specifically designed for, the manufacture for export to the United States or to third country markets in direct competition with U.S. exports, of textiles, apparel, footwear, handbags, flat goods (such as wallets or coin purses worn on the person), work gloves or leather wearing apparel? No.
13. FAA Sec. 119(g) (4)-(6). Will the assistance (a) support training and education efforts which improve the capacity of recipient countries to prevent loss of biological diversity; (b) be provided under a long-term agreement in which the recipient country agrees to protect ecosystems or other wildlife habitats; (c) support efforts to identify and survey ecosystems in recipient countries worthy of protection; or (d) by any direct or indirect means significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas? (a) Yes. (b) No. (c) Yes; through training of agricultural researchers, the project will improve the capacity of recipient countries to prevent the loss of biological diversity. (d) No.
14. FAA 121 (d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling N/A.

receipt and expenditure of project funds (either dollars or local currency generated therefrom)?

15. FY 1989 Appropriations Act. If assistance is to be made to a United States PVO (other than a cooperative development organization), does it obtain at least 20 percent of its total annual funding for international activities from sources other than the United States Government? N/A.
16. FY 1989 Appropriations Act Sec. 538. If assistance is being made available to a PVO, has that organization provided upon timely request any document, file or record necessary to the auditing requirements of A.I.D., and is the PVO registered with A.I.D.? N/A.
17. FY 1989 Appropriations Act Sec. 514. If funds are being obligated under an appropriation account to which they were not appropriated, has prior approval of the Appropriations Committees of Congress been obtained? N/A.
18. State Authorization Sec. 139 (as interpreted by conference report). Has confirmation of the date of signing of the project agreement, including the amount involved, been cabled to State L/T and A.I.D. Leg within 60 days of the agreement's entry into force with respect to the United States, and has the full text of the agreement been pouched to those same offices? (See Handbook 3, Appendix 6G for agreements covered by this provision). N/A.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FY 1989 Appropriations Act Sec. 548 (as interpreted by conference report). If assistance is for agricultural development activities (specifically, any testing or breeding feasibility study, variety improvement or introduction, consultancy, publication, conference, or training), are such activities (a) specifically and principally designed to increase agricultural exports by the host country to a country other than the United States, where the export would lead to direct competition in that third country with exports of a similar commodity grown or produced in the United States, and can the activities reasonably be expected to cause substantial injury to U.S. exporters of a similar agricultural commodity; or (b) in support of research that is intended primarily to benefit U.S. producers?

(a) No. (b) The research will indirectly benefit US producers by maintaining close relationships with US universities conducting agricultural research.

b. FAA Secs. 102(b), 111, 113, 281(a). Describe 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, dispersing investment from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward a better life, and

(a) The project will increase productivity and incomes of rural men, women and families involved in agricultural production. It seeks to increase use of appropriate agricultural technologies and will focus on rural low-income populations through the farming systems approach. (b) While the project will not help develop cooperatives, many cooperative members will benefit through increased access to improved technologies.

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) The project will support the local generation and adaptation of agricultural technology which will encourage self-help efforts. (d) The project will promote the participation of women through training programs which sensitize researchers and extension agents and through support of a WID coordinator. (e) The project will be implemented by CARDI and UWI, both important regional institutions.

c. FAA Secs. 103, 103A, 104, 105, 106, 120-21; FY 1989 Appropriations Act (Development Fund for Africa). Does the project fit the criteria for the source of funds (functional account) being used?

Yes. 103.

d. FAA Sec. 107. Is emphasis placed on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?

Yes.

e. FAA Sec. 110, 124(d). Will the recipient country provide at least 25 percent of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?

N/A. This is a regional project, of which regional institutions and host governments are sharing 50% of project costs.

f. FAA Sec. 128(b). If the activity attempts to increase the institutional capabilities of private organizations or the government of the country, or if it attempts to stimulate scientific and technological research, has it been designed and will it be monitored to ensure that the ultimate beneficiaries are the poor majority?

Yes.

g. 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 processes essential to self-government.

Project responds to basic needs of the host country populations through the provision of vital agricultural technology to the majority of small farmers, and training and support of extension, research and university personnel.

h. FY 1989 Appropriations Act Sec. 536. Are any of the funds to be used for the performance of abortions as a method of family planning or to motivate or coerce any person to practice abortions?

No.

Are any of the funds to be used to pay for the performance of involuntary sterilization as a method of family planning or to coerce or provide any financial incentive to any person to undergo sterilizations?

Are any of the funds to be used to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions or involuntary sterilization as a means of family planning?

- i. FY 1989 Appropriations Act. Is the assistance being made available to any organization or program which has been determined to support or participate in the management of a program of coercive abortion or involuntary sterilization? No.
- If assistance is from the population functional account, are any of the funds to be made available to voluntary family planning projects which do not offer, either directly or through referral to or information about access to, a broad range of family planning methods and services? N/A.
- j. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Yes.
- k. FY 1989 Appropriations Act. What portion of the funds will be available only for activities of economically and socially disadvantaged enterprises, historically black colleges and universities, colleges and universities having a student body in which more than 20 percent of the students are Hispanic Americans, and private and voluntary organizations which are controlled by individuals who are black Americans, Hispanic Americans, or Native Americans, or who are economically or socially disadvantaged (including women)? No plans to specify amount; where relevant, contracting services to 8(a), HBCUs and other firms will be encouraged.
- l. FAA Sec. 118(c). Does the assistance comply with the environmental procedures set forth in A.I.D. Regulation 16? Does the assistance place a

high priority on conservation and sustainable management of tropical forests? Specifically, does the assistance, to the fullest extent feasible: (a) stress the importance of conserving and sustainably managing forest resources; (b) support activities which offer employment and income alternatives to those who otherwise would cause destruction and loss of forests, and help countries identify and implement alternatives to colonizing forested areas; (c) support training programs, educational efforts and the establishment or strengthening of institutions to improve forest management; (d) help end destructive slash-and-burn agriculture by supporting stable and productive farming practices; (e) help conserve forests which have not yet been degraded by helping to increase production on lands already cleared or degraded; (f) conserve forested watersheds and rehabilitate those which have been deforested; (g) support training, research, and other actions which lead to sustainable and more environmentally sound practices for timber harvesting, removal, and processing; (h) support research to expand knowledge of tropical forests and identify alternatives which will prevent forest destruction, loss, or degradation; (i) conserve biological diversity in forest areas by supporting efforts to identify, establish, and maintain a representative network of protected tropical forest ecosystems on a worldwide basis, by making the establishment of protected areas a condition of support for activities involving forest clearance or degradation, and by helping to identify

Yes, the assistance complies with environmental procedures set forth in AID regulation 16. However, because this project does not include specific activities with tropical forests, and because the environmental threshold decision was a Negative Determination, sections (a) through (k) are not applicable.

tropical forest ecosystems and species in need of protection and establish and maintain appropriate protected areas; (j) seek to increase the awareness of U.S. government agencies and other donors of the immediate and long-term value of tropical forests; and (k) utilize the resources and abilities of all relevant U.S. government agencies?

- m. FAA Sec. 118(c) (13). If the assistance will support a program or project significantly affecting tropical forests (including projects involving the planting of exotic plant species), will the program or project (a) be based upon careful analysis of the alternatives available to achieve the best sustainable use of the land, and (b) take full account of the environmental impacts of the proposed activities on biological diversity? N/A.
- n. FAA Sec. 118(c) (14). Will assistance be used for (a) the procurement or use of logging equipment, unless an environmental assessment indicates that all timber harvesting operations involved will be conducted in an environmentally sound manner and that the proposed activity will produce positive economic benefits and sustainable forest management systems; or (b) actions which will significantly degrade national parks or similar protected areas which contain tropical forests, or introduce exotic plants or animals into such areas? No.
- o. FAA Sec. 118 (c) (15). Will assistance be used for (a) activities which would result in the conversion of forest lands to the rearing of livestock; (b) the

construction, upgrading, or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undegraded forest lands; (c) the colonization of forest lands; or (d) the construction of dams or other water control structures which flood relatively undegraded forest lands, unless with respect to each such activity an environmental assessment indicates that the activity an environmental assessment indicates that the activity will contribute significantly and directly to improving the livelihood of the rural poor and will be conducted in an environmentally sound manner which supports sustainable development?

- p. FY 1989 Appropriations Act. If assistance will come from the Sub-Saharan Africa DA account, is it (a) to be used to help the poor majority in Sub-Saharan Africa through a process of long-term development and economic growth that is equitable, participatory, environmentally sustainable, and self-reliant; (b) being provided in accordance with the policies contained in section 102 of the FAA; (c) being provided, when consistent with the objectives of such assistance, through Africa, United States and other PVOs that have demonstrated effectiveness in the promotion of local grassroots activities on behalf of long-term development, in Sub-Saharan Africa; (d) being used to help overcome shorter-term constraints to long-term development, to promote reform of sectoral economic policies, to support the critical sector priorities of agricultural production and natural resources,
- N/A.

health, voluntary family planning services, education, and income generating opportunities, to bring about appropriate sectoral restructuring of the Sub-Saharan African economies, to support reform in public administration and finances and to establish a favorable environment for individual enterprise and self-sustaining development, and to take into account, in assisted policy reforms, the need to protect vulnerable groups; (e) being used to increase agricultural production in ways that protect and restore the natural resource base, especially food production, to maintain and improve basic transportation and communication networks, to maintain and restore the natural resource base in ways that increase agricultural production, to improve health conditions with special emphasis on meeting the health needs of mothers and children, including the establishment of self-sustaining primary health care systems that give priority to preventive care, to provide increased access to voluntary family planning services, to improve basic literacy and mathematics especially to those outside the formal educational system and to improve primary education, and to develop income-generating opportunities for the unemployed and underemployed in urban and rural areas?

- q. FY 1989 Appropriations Act Sec. 515. If deob/reob authority is sought to be exercised in the provision of assistance, are the funds being obligated for the same general purpose, and for countries within the same general region as originally obligated, and have the Appropriations Committees of both Houses of Congress been properly notified?

Yes.

3. Economic Support Fund Project Criteria

- a. FAA Sec. 531(a). Will this assistance promote economic and political stability? To the maximum extent feasible, is this assistance consistent with the policy directions, purposes, and programs of Part I of the FAA? Yes.
Yes.
- b. FAA Sec. 531(e). Will this assistance be used for military or paramilitary purposes? No.
- c. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made? N/A.

Technical Analysis*

Design of the technical aspects of this project has benefitted from AID's experience with two research projects which have been implemented by CARDI since 1978 and with the Caribbean Agricultural Extension Project (CAEP) implemented in conjunction with UWI beginning in 1980.

As a result of these projects, a farming systems research and development methodology as a primary research strategy and a farm management methodology as a primary extension strategy have been adopted. The technical analysis addresses the appropriateness of these two methodologies in the context of the Eastern Caribbean. The technical analysis also discusses the procedures for setting research and extension priorities among the various commodities of economic importance in the region; reviews progress and lessons learned under the CAEP Project in improving national extension services and discusses the desirability of improved research/extension linkages. The analysis also explains the importance of pest management research and specifies CARDI's role in this research.

*The Technical Analysis and Background and Rationale of the project paper have taken advantage of a number of recent studies and papers including:

1. "An Overview of the Eastern Caribbean Agricultural Sector," paper prepared for USAID by Albert L. Brown (team leader), James A. Coleman, and Arthur Coutou, November 15, 1988.
2. "Review of Agricultural Diversification in the O.E.C.S.," prepared for the Canadian International Development Agency, January 1987.
3. "Notes on Agricultural Strategies for the Eastern Caribbean," prepared for USAID by Roger D. Norton, November 1988.
4. "USAID RDO/C Agricultural Sector Strategy 1990-1994," December 1, 1988.
5. "Caribbean Agricultural Research and Development Institute (CARDI) Strategic Plan 1988/93," June 1988, and various other documents by and about CARDI.
6. "The Caribbean Agricultural Extension Project (CAEP): More Productive Agriculture through Extension," and various other documents by and about CAEP.
7. The 1988 external evaluation draft report of the CAEP which has been received recently by RDO/C.

1. Methodologies

Two factors are primary in choosing appropriate methodologies for research and extension strategies: (1) the complexity of the farming environment of the Eastern Caribbean and (2) the advantages of getting researchers and extension staff working together with farmers to identify needs and desires, develop improved technologies to respond to those needs and desires, and communicate information to make farmers aware of new opportunities.

The OECS countries are characterized by physical and socio-economic environments which present many challenges to research and extension.

Land. Agriculture in the OECS countries utilizes one-third of the islands' land area, the rest being suitable, because of terrain, only for limited grazing, forestry, fuel wood, and watershed. Farming is generally restricted to the scattered coastal valleys and foothills to which, because of steep terrain, access is often constrained. Soils, being generally of recent volcanic origin, are fertile and recover quickly from continuous cropping. The sloping land is readily eroded without careful water and land management practices.

Climate. The climate is tropical. The Leewards, especially Antigua, have a long dry season. Rainfall is much higher in the Windwards. Rainfall distribution varies considerably from island to island, from leeward to windward sides of each island, and according to altitude. In addition, dry spells exceeding two weeks can occur in the rainy season and significant showers can sometimes fall in the driest months. Damaging hurricanes and tropical storms average one in five to six years. Rainfall variability is significant and is largely responsible for variations in production from year to year.

Farm Size. Agriculture is primarily a small farm operation. More than 90 percent of the farms are less than ten acres in size, half smaller than an acre. These small units, farmed by hand tools primarily for family subsistence, generate a small surplus which is consolidated by hucksters serving the intraregional trade.

The small average farm size limits family income and market influence as it increases costs and reduces access to all services. Size is exacerbated by subdivision of many farms

into dispersed parcels. Consolidation to achieve economic scale is constrained by weakness of land markets, limited title registry, restricted credit, and multiple ownership. The absence of alternative occupations may be an even greater constraint to consolidation.

Farming Population Characteristics. The farming population is highly literate, relatively healthy, but aging. Most of the farmers who are already in agriculture will remain in agriculture. There is no other way to increase their standard of living other than to increase the possibilities for raising incomes from agricultural activity.

Agricultural labor can be divided into three basic categories: estate work, off-farm labor, and own-farm labor. Most young people are averse to providing labor on estates or on others' farms, but would consider a career in agriculture if they had their own land. This implies limited hired-labor availability for more intensive types of farming which has implications for choice of technologies.

Gender Differences. Tasks on existing small farms are segregated by sex. Men tend to be involved in land preparation, planting, and harvesting of family plots. They also perform estate labor for cash wages and exchange labor on a reciprocal basis with other farms. Women participate in weeding and harvesting and generally take responsibility for marketing produce surplus to family consumption needs. They also gather fruit for preparation or sale, in addition to housekeeping and child rearing chores. Depending on their age, children either tend home gardens or participate in farm labor activities.

The farming systems that have evolved in the Eastern Caribbean involve combinations of commodities -- crops and animals -- influenced by a range of factors including family needs, technologies, labor availabilities, input availabilities, soil, climate, custom, information, and others. The focal point of these farming systems is the decision-making process of the farm household, but even this can be complicated by gender or other factors. If the decision-making process is understood accurately, farmer behavior surfaces as logical responses to economic and social opportunities, given existing constraints.

For example, labor as a factor of production is affected by age of the farmer. The majority of the small farmers in the

Eastern Caribbean are over 55 years of age. Although age does not appear to be a hindrance to the amount of labor the farmer puts into the system, it can affect the rate of acceptance of new technologies. Many farmers feel they have established, through sufficient experience, adequate farming systems and that their major constraints are insufficient markets and consequently inadequate prices and the lack of much needed inputs, e.g., fertilizers, pesticides, and credit. Even though literacy may be high, tradition and custom may be stronger influences in the extension process. Therefore, new technologies must be thoroughly tested under conditions that the farmer can replicate and they must be communicated in a way that the farmer understands and has confidence in.

Labor is also affected by gender. Tasks are often allocated by sex. Introduction of vegetables may mean more labor requirement by women, and they will want an incentive, e.g., control over resulting income, if they are to have interest. Similarly, men may be more taken by growing non-traditional crops for export. And women are generally active in the role of hucksters and post-harvest processing. Therefore, gender analysis must play a role in developing and communicating improved technologies.

Farming systems research and development methodology has been discussed in detail in previous project papers. In brief, it consists of identification of key problems through initial reconnaissance surveys (sondoes) by teams of researchers and extensionists; on-station research to assess available technology; the design and testing of new innovations to solve remaining problems; on-farm testing of alternative innovations by researchers with the involvement of extensionists and farmers on a greater number of farms and under specific agronomic conditions; and demonstrations on farmer's fields to further adjust the technology and disseminate improved technologies to other farmers. Because of the complex nature of the region's small and medium scale agriculture -- physical, human, and institutional factors which change from country to country, region (within country) to region, and even, sometimes, farm to farm -- farming systems research methodology (FSR/D) is appropriate for the OECS.

Detailed explanation of the home/farm management budgeting methodology is also given in previous project papers. The essence of the home/farm management budgeting methodology is to help the farm family analyze its whole-farm operation with

attention to cash flow, costs of inputs, use of labor, return on investment, and alternative farm profit opportunities. The farmer is viewed as a resource manager and small enterprise decisionmaker capable of considering alternative investment strategies and consequences, including risk-reward analyses.

The linkage between farming systems and farm management is that the former serves as a problem-identification framework, e.g., what commodity combinations and practices might improve income, while the latter serves as a framework for working with the individual farm families within the context of the whole farm operation to understand the implications of adapting new farming systems. This is a particularly insightful combination in the context of introducing new commodities, e.g., non-traditional export commodities which have not been major components of the farmer's system previously.

Technology generation and transfer, research and extension, should be a continuum. The FSR/D methodology, by encouraging research and extension staff to work together at several stages, particularly the early stages of target area and farmer selection, rapid reconnaissance (sondeo), and specific problem survey and the latter stages of on-farm testing and on-farm validation, facilitates the continuum actually taking place. And the home/farm management budgeting process employed by the extension staff provides a very effective means of demonstrating the implications to farmers of adapting the changes that FSR/D might suggest.

More attention to two aspects would considerably strengthen the CARDI and UWI research and extension methodologies. First, FSR/D is only as successful as the commodity research which provides the commodities of which any system is composed. Collaborative research networks must be much more effective in linking CARDI to new sources of improved germplasm and CARDI commodity and technology adaptation researchers must be much more effective in working together to identify and test combinations of commodities, varieties, and practices which will provide higher returns (or other desired benefits) to the farmers. Second, gender is a variable which FSR/D and farm management researchers need additional help from trained social scientists (including economists) in understanding how the gender of farmers influences what they are willing and able to do.

2. Priorities

Neither CARDI, UWI, or the OECS ministries of agriculture have unlimited financial resources. They must make choices to make best use of their scarce trained resources, their technical staff. CARDI's Strategic Plan identifies six factors to guide its research priorities:

- o Technical feasibility -- the potential for resolving the particular technical problem within a reasonable cost and time frame, its probability of success, and environmental soundness.
- o Potential economic impact -- the economic value to the region or member states if the efforts are successful.
- o Member emphasis -- the priority which member states place on the research activity compared to alternatives.
- o Resources required -- the financial and human costs to implement the research during the time-frame required to show results.
- o Comparative advantage -- whether CARDI has a clear advantage over other entities that might do research.
- o Synergy -- the strategic fit with CARDI's other activities.

From these criteria, CARDI has made choices such as emphasizing adaptive research (leaving basic genetic improvement to international agricultural research centers) and not carrying out research on bananas (which WINBAN is carrying out).

For purposes of the AREP, CARDI went a step further by identifying priorities for each of the seven OECS countries. In each case it specified results expected, research focus, assumptions, staff involved, and stations and other facilities utilized. It should be noted that the initial set of priorities is preliminary. The priority-setting exercise will be included in the annual planning cycle of CARDI (in which the OECS countries play an active role), with active participation by UWI staff. The first set of priorities is included in Attachment 1. CARDI plans to use project financed technical collaboration to assist in research priority setting.

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3. Improving National Extension Services

The draft report of the recent CAEP external evaluation concludes that National Extension Services now have "the ability to articulate educational roles and functions, to impact farmer behavior through contact with frontline extension officers, to store information through national and regional communications activities and to help shape a more professional, optimistic future oriented agricultural sector." The report goes on to say that unless regional input is available, the character and effectiveness of some of these programs will be maintained at minimal levels while others will regress and deteriorate. The report recommends that

- 1) a regional coordinating and communication function such as REACC continue with the express purpose of sharing information, supporting regional programming and continuing the process of increasing the professionalism of extension services and the people involved in Agriculture.
- 2) Sources of technical assistance be maintained to help National Extension Services create and maintain practical and effective managerial procedures to meet their individual and changing needs.
- 3) Efforts and mechanisms be supported to coordinate and integrate the various multinational, regional and national programs focussed on agricultural sector development.
- 4) Programs of coordinated regional inservice training, specialized diploma and degree training, and regional backstopping be continued to maintain and enhance the professional capability of Extension personnel.

4. Research/Extension Linkages

Research and extension can make direct contributions to increasing the yields of major commodities, but can also impact greatly on other aspects of production and marketing. In a country such as the U.S., it is estimated that as much as ninety percent of research expenditures are allocated for so-called maintenance research. Other research is directed at learning appropriate agronomic practices, e.g., plant density, cultivation practices, fertilizer amounts and timing, moisture amounts and timing, to increase yields and incomes. Research helps to identify and test the adaptability of new crops. It

also contributes to learning about farming systems which best combine several crops and animals to increase farm household income. Moreover, improved research techniques can identify and test systems which make more effective use of, and provide higher income levels to, women in agriculture, as demonstrated under the AID-funded FSR/D program. Research is also used to identify sustainable agricultural systems, which at the same time increase production and sustain and enhance the natural resource base. Extension must be an integral part of the whole process of improving productivity. In a mature research and extension system, the two processes integrate, and serve to mutually reinforce one another. However, extension, in practice, is generally thought of as the communication of research information to (and from) the farmer or other end-user. In the economic analysis for this Project it was found that extension both increased the speed of adoption and for most commodities doubled the predicted adoption rates.

It is considered desirable to have agricultural research and extension as integral parts of one institution. Such is the case in the U.S. as part of the land grant university system and in other developed and developing countries. This type of arrangement facilitates the planning, programming, budgeting and communication necessary to develop and transfer technology and to provide feed back on technology acceptance and relevance.

In the Eastern Caribbean, each country has its own extension service but because of limited resources cannot support a fullscale research program. CARDI, as a regional organization provides the research service for all of the countries. The problem then of research and extension integration is more difficult. It is recommended that this Project support research and extension linkages throughout the OECS countries by encouraging a) equal representation of CARDI and UWI on a project management committee; b) CARDI, UWI and to the extent possible National Extension Services (NES) staff to maintain joint offices in St. Lucia and Antigua; c) participation by UWI and NES staff in the annual program planning process of CARDI and participation of CARDI staff in the annual program planning of the NES; d) acceptance by all parties of the key role played by technology adaptation specialists in the technology generation and transfer process; and e) collaboration of CARDI and NES staff in rapid reconnaissance surveys.

5. Pest Management and Pesticide Control

Pests and diseases are constantly adapting to natural tolerance or resistance bred into varieties and to chemical or biological control. Therefore, much research is directed at discovering new means of pest and disease management. Looking at the research priorities attached to the technical analysis in Annex A and the research topics identified during the economic analysis (Annex F) it is clear that the majority of the program involves problems in pest management. Pest management is not only a research topic. Extensionists need to make sure that pest management recommendations reach the farmer in a usable form. The UWI Department of Extension has published numerous information bulletins on pest management recommendations and pesticide use. It has also recently completed a video entitled "Pesticide Use and Abuse." UWI extension specialists work with NES to insure that recommendations and other materials reach farmers.

The regulation of pesticide introduction and use in the region is the responsibility of the various island governments and generally resides in the Ministry of Agriculture. Each island has a fairly uniform Pesticide Control Act which governs pesticide entry and use. Some of the countries also have developed regulations which are used to implement these acts. These regulations generally include a pesticide review board which is responsible among other things for reviewing all pesticide entry permit applications. CARDI staff generally provide the technical expertise on these review boards. CARDI has no regulatory function regarding pesticide entry and use nor should it have as a regional research organization providing pest management recommendations.

RESEARCH PRIORITIES

<u>Country</u>	<u>Results*</u>	<u>Research Focus</u>	<u>Assumption</u>	<u>Staff</u>	<u>Stations/Facilities</u>
St. Kitts/Nevis	1. Increase vegetable prod. with emphasis on onions with potatoes, cabbage, and tomatoes for local hotel consumption.	Varietal selection and adaptation (CIP, AVRDC, private seed companies)	Most land gov't owned, staying in sugar, relatively large holdings can learn from Jamaica & Barbados re sugar diversification.	H. Patterson (Rep, livestock) J. Leach (Agronomy) S. Weeks - CARDIES (Pest Management)	CARDI office located at small station; ministry within 2-3 miles.
	2. Increase production of sweet potato, hot pepper, mango, breadfruit, and pineapple for export.	Varietal selection and adaptation (CIP, IWI)	2. Gov't has political commitment to diversify. 3. Wages high, but not too high to be competitive. 4. Low rainfall, but higher than Antigua.	1 Nat. Research Officer (very active) Extension	
	<u>Other Donors</u>				
	1. IFAD considering project on sheep and goat production systems (on-farming emphasis) with 1 livestock specialist and 1 economist.	Small Ruminant CRSP should be involved; CIAT Australia.			

* Commodities subject to review at 2 years.

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RESEARCH PRIORITIES

<u>Country</u>	<u>Results</u>	<u>Research Focus</u>	<u>Assumption</u>	<u>Staff</u>	<u>Stations/Facilities</u>
Antigua/Barbuda	<p>1. Increase vegetable prod. with emphasis on cabbage and tomatoes for hotel/export</p> <p>2. Increase production of cucubics (cucumbers, melons) sweet potatoes hot peppers, papayas and pineapple for export</p>	<p>Varietal selection and adaptation, with emphasis on water management (AVRDC, Texas A&M, Israel, private seed production)</p>	<p>Predictable weather with low humidity. Growing tourist demand. High wage rate & need supplemental irrigation for vegetables. Land tenure problems. Limited political commitment to agriculture. Relatively low probability for success.</p>	<p>Ameen (Rep, CARDATS) Cooper (Agronomy) Patterson (forages) C. Douglas (economics)</p>	<p>Sub-regional headquarters: Office at Friar's Hope (near ministry). for CARDI, CAEP, CARDATS</p> <p>Seed production at Betty's Hope - 25 ha</p>
	<p><u>Other Donors</u></p> <p>1. EDF supporting pasture agronomy (alkaline soils); may shift to Guyana or Jamaica (acid soils)</p> <p>2. IFAD considering project on sheep and goat production systems (on-farm emphasis) (see St. Kitts)</p> <p>3. Barclays Bank supporting seed production & quality control (peanut, pigeon pea, pepper tannia and yam.</p>	<p>CIAT, Australia should be involved introduction of new varieties.</p> <p>Small ruminant CRSP should be involved.</p>		<p>MOA Research Officer. Extension staff</p>	

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<u>Country</u>	<u>Results</u>	<u>Research Focus</u>	<u>Assumption</u>	<u>Staff</u>	<u>Stations/Facilities</u>
Antigua/Barbuda	<p>4. Italy preparing to support seed production:</p> <p>(a) Screen and multiply seed of improved varieties of forages, legumes and other crops.</p> <p>(b) Establish internal quality control for seed multiplication of vegetatively propagated materials (yams, tannia, and ornamentals).</p> <p>(c) Improve seed testing services.</p> <p>(d) Develop better policy, extension, and general awareness contributing to expanded use of better plastering material.</p>				

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RESEARCH PRIORITIES

<u>Country</u>	<u>Results</u>	<u>Research Focus</u>	<u>Assumption</u>	<u>Staff</u>	<u>Stations/Facilities</u>
Montserrat	1. Increase vegetable production with emphasis on onions, white potato, cold crops, and tomatoes for local consumption.	On-farm trials		J. Ross (CARDATS) No Research Officer.	CARDI office at distance from ministry.
	2. Increase production of sweet potato, hot pepper, mango, bread fruit, and pineapple for export.	On-farm trials			

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RESEARCH PRIORITIES

<u>Country</u>	<u>Results</u>	<u>Research Focus</u>	<u>Assumption</u>	<u>Staff</u>	<u>Stations/Facilities</u>
Dominica	<p>1. Increase plantain production for local consumption/exports</p> <p>2. Develop systems of agro-forestry (Western coastal area).</p>	<p>Varietal selection and adaption (IHHA in Honduras, INIBAP)</p> <p>Testing different leguminous trees fruit trees, with crops and animals (CATIE)</p>	<p>Island with heaviest rainfall. Much erosion. Country is very dependent upon agriculture good political support.</p>	<p>Fletcher (Rep., agronomy, PDD) W. Rolle (live-stock). F. McDonald (plant pathology). BID entomologist BDD post harvest Bailey (agronomist, CARDATS). No National Res. Officer X Extension staff.</p>	<p>All CARDI staff officed in Botanical Garden complex with ministry staff. Laboratory being upgraded by BDD.</p>

Other Donors

1. EDF supporting
 - (a) Systems increasing mutton & goat meat and dairy on small farms: forages
 - (b) Increase in production of aroids - tannia, dasheen - for export
 - (c) Tissue culture of aroids.
2. BDD supporting increase in production of tree crops - mango, grapefruit, avocado, passion fruit, and soursop for diversification - focus on pest control, agronomy, varietal evaluation and training.
3. USAID might provide post-harvest technologist and fruit production extensionist under TRO PRO.

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RESEARCH PRIORITIES

<u>Country</u>	<u>Results</u>	<u>Research Focus</u>	<u>Assumption</u>	<u>Staff</u>	<u>Stations/Facilities</u>
St. Lucia	1. Increase yam and sweet potato (main work done on St. Vincent) for export.	Varietal selection and adaptation (CIP, IITA)	Good rainfall Good political Good research facilities.	C. George B. Clark J. Hammerton (head of unit) W. Messiah (livestock) CARDATS D. Campbell (CAEP) 1 Nat. Res. Officer X Extension staff.	Sub-regional head-quarters for Windwards; exploring options for moving CARDI and CAEP together. Good research station to be expanded and
	2. Increase production of plantain, papaya, breadfruit, pineapple and ginger for export	Varietal selection and adoption (FIIIA, INIBAP)			
	<u>Other Donors</u>				
	1. CIDA/CARDATS increasing mutton for import substitution.				
	2. BDD hard fruit research on Dominica to be tested on St. Lucia.				

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RESEARCH PRIORITIES

<u>Country</u>	<u>Results</u>	<u>Research Focus</u>	<u>Assumption</u>	<u>Staff</u>	<u>Stations/Facilities</u>
St. Vincent	1. Increase sweet potato and eddoe (aroids) production for export (traditional)	Varietal selection and adaption (CIP, AVRDC, INRA, IITA)	Good rainfall Good political Good local staff	M. Rao (Rep, root crops) CARDATS 1 Nat. Res. Officer. X Extension staff.	Upgrading fields and developing building at station-Orange Hill.
	2. Increase production of plantain, mango, passion fruit, hot pepper, pineapple and ginger for export (diversification).	Varietal selection and adaption.			
	<u>Other Donors</u>				
	1. CARDATS increasing mutton and goat meat production for import substitution.	Involve small ruminants CRSP.			

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RESEARCH PRIORITIES

<u>Country</u>	<u>Results</u>	<u>Research Focus</u>	<u>Assumption</u>	<u>Staff</u>	<u>Stations/Facilities</u>
Grenada	<p>1. Increase production of cocoa and nutmet for export (traditional)</p> <p>2. Increase production of soursop, mango, breadfruit, papaya and hot pepper for export.</p>	<p>Varietal selection and adoption with emphasis on pest and disease management (IICA/CATIE networks).</p> <p>Varietal selection and adaption (St. Lucia is main source of germ plasm.</p>	<p>Very agriculturally oriented - good political support. Export oriented (to Trinidad and elsewhere)</p>	<p>Buckmire (entomology) R. Andal (agronomy) CARDATS Headquarters H. Saul H. Singh - farm management. R. Reid - marketing. C. Browne - country officer. Nat. Res. Officer X Extension staff.</p>	

1/8/81

PROJECT TECHNICAL PERSONNEL

A. CARDI

<u>Position</u>	<u>Source of Funds</u>	<u>Location</u>	<u>Job Description</u>	<u>Time Allocated to Project</u>
Executive Director	CARDI core	Trinidad		6%
Deputy Ex. Director (R)	CARDI core	St. Lucia	Proj.Manager	60%
Deputy Ex. Director (D)	CARDI core	Grenada		6%
Dir.of Professional Serv.	CARDI core	Trinidad		6%
Dir.of Finance/Admin.	CARDI core	Trinidad		6%
Dir.of Planning	CARDI core	Trinidad		6%
Program Leaders:				
Crop	CARDI core	Trinidad	Res.Manager	10%
Animal	CARDI core	Barbados	Res.Manager	10%
Tech. adapt/Transfer	CARDI core	St. Lucia	Tech.Adapt. Coordinator	60%
CARDI Representatives	CARDI core	Ea. EC Country	Admin.	105%
Weed Scientist	CARDI core	St. Lucia	Sub.Matter Specialist	15%
Plant Breeder	CARDI core	Guyana	"	15%
Plant Pathologist	CARDI core	Dominica	"	15%
Entomologist Jamaica	CARDI core	Jamaica	"	15%
Agric. Economist	CARDI core	Antigua	"	15%
Livestock Specialist	CARDI core	Trinidad	"	15%
Agronomist	CARDI core	St. Vincent	"	15%
Biometrician	CARDI core	Trinidad	"	15%
Documentalist	CARDI core	Trinidad	Literature Service	15%
Soil Scientist	CARDI core	Trinidad	Sub.Matter Specialist	15%
Techicians (20)	CARDI core	All CARDI units except Belize	Technical Support	

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A. CARDI (cont'd.)

<u>Position</u>	<u>Source of Funds</u>	<u>Location</u>	<u>Job Description</u>	<u>Time Allocated to Project</u>
Pomologist	AREP/USAID	St. Lucia	Fruit Crop Research	100%
Agric. Economist	AREP/USAID	St. Lucia	Socio Econ. Support	100%
Tech. Adapt. Specialist: 1	AREP/USAID	Dominica	Technology Adaptation	100%
2	AREP/USAID	Grenada	Technology Adaptation	100%
3	AREP/USAID	St. Lucia	Technology Adaptation	100%
4	AREP/USAID	St. Vincent	Technology Adaptation	100%
5	AREP/USAID	St. Kitts	Technology Adaptation	100%
6	AREP/USAID	Antigua	Technology Adaptation	100%

EXTENSION

B. UWI

<u>Position</u>	<u>Source of Funds</u>	<u>Location</u>	<u>Job Description</u>	<u>Time Allocated to Project</u>
Windwards Ext. Spec.	UGC/UWI	St. Lucia	Ext.training Field Coord.	100%
Head/Dept.of Extension	USG/UWI	Trinidad	Admin/Mgt Instruction	25%
Lecturer	USG/UWI	Trinidad	Instruction Communication Editing/Prog.	10%
Lecturer	UGC/UWI	Trinidad	Acad.Supervi- sion/Technical Editor/Training in Comp. Apps	10%
Ag. Econ/Farm Manage- ment Crops Scientists Livestock Scientists Plant Sci & Bio Chem Soil Scientists	UGC/UWI	Trinidad	Dip.instruction PG supervision Inservice train- ing, Technical Writing & Prepa- ration of Communi- cation materials	10% from ea of 36 Faculty
Dean, FA	UGC/UWI	Trinidad	Proj.Management	
Dept. of Grad. Asst.	UGC/UWI	Trinidad	Fact Sheets Preparation	10%
Technicians for Communica- tions Unit (Composer operator, Graphics, Videographer, Printer, Office Assistant)	UGC/UWI	Trinidad	Production of Communica- tions and back- stopping material	50%
Clerical support staff/ cleaner, etc.	UGC/UWI	Trinidad	Typing, corres- pondence, etc.	100%
Extension specialists Leewards	AREP/USAID	St. Lucia	Program, plan and coordinate service develop- ment	100%

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B. UWI (cont'd)

<u>Position</u>	<u>Source of Funds</u>	<u>Location</u>	<u>Job Description</u>	<u>Time Allocated to Project</u>
Communications Coordinator	AREP/USAID	Trinidad	Coordinate communications unit activities	100%
Farm Management Specialist	AREP/USAID	Trinidad	Coordinate farm management surveys analysis and extension training	100%

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**ANALYSIS OF THE NET ECONOMIC BENEFITS
OF AGRICULTURAL RESEARCH AND EXTENSION
IN THE EASTERN CARIBBEAN**

Agricultural productivity gains in the OECS can provide food, generate income and employment, and earn or save foreign exchange. Increased production of commodities listed in Table 1 can reduce the variability of both EC income and foreign exchange earnings. Improved nutrition as well as income and employment effects in other sectors can also result from agricultural growth. While improved technologies and institutions generated and extended through research and extension are vital to agricultural growth and productivity, it is nevertheless important to assess the likely net economic benefits associated with the sizable public (US and EC) investment in research and extension which is being proposed. The economic analysis below sheds some light on both the overall economic feasibility of the project as well as the relative net economic benefits of research and extension affecting different commodities.

1. Conceptual issues with respect to agricultural research evaluation in the Eastern Caribbean:

Since the mid-1980's numerous studies have examined the impacts of agricultural research and extension (R & E) on productivity and output growth for a wide range of commodities and countries. Ruttan in his book on agricultural research policy lists 36 studies conducted prior to 1980; several more have been completed since that time. The vast majority of these analyses have indicated rates of return to public R & E investment well in excess of the 15-20% which private firms might consider necessary for investments with similar risk levels. Private firms, however, would have little incentive to undertake sufficient research on these commodities because it would be difficult to maintain proprietary rights to the research information produced.

Table 1. Commodities Inculded in CARDI and UWI Research and Extension Programs

Local Market

white potato
cabbage
onion
tomato
mutton
goats
dairy

Traditional Exports

cocoa
nutmeg

Non-traditional exports

sweet potato
yams
eddoes
tannia
dasheen
hot pepper
ginger
curcurbics
plantain
papaya
pineapple
breadfruit
pineapple
soursap
passion fruit
avocado
mango
guavafruit

For the research and extension efforts of CARDI and UWI supported by this project, one can hope that the rates of return would be equally as high as those measured in other countries. However, one can not just assume that this will be the case and furthermore, returns are likely to vary by commodity, reflecting relative differences in quantities produced, probabilities of research success, research adoption and depreciation rates, and alternative market situations. For many of the commodities evaluated previously in other countries, a large number of hectares or units of production were affected by the research. Many of the commodities produced by the EC countries are relatively small in quantity and face highly competitive international market situations. On the other hand, the EC countries have the advantages of relatively homogeneous climatic and socioeconomic conditions. And, several of the needed technologies can be transferred and adopted from other national and international research institutions and can build on the results of previous USAID as well as other donor funded research and extension projects. Therefore, a quantitative evaluation specific to the Eastern Caribbean research and extension situation is needed.

Any quantitative evaluation of projected benefits of research investments must attempt to answer these questions: 1) What are the chances of producing new knowledge or technologies if resources are allocated to particular commodities or problem areas? 2) What will be the demand for that knowledge or technology? and 3) What would be the value to society of that knowledge or technology? An extension evaluation must ask a fourth question: 4) What would be the timing and spread of technology adoption with and without extension?

Scientists knowledgeable about the different commodities and

areas of research should help answer the first question. The probability of successful research and the timing with which research results can be expected must be ascertained. Benefits received today are worth more than the same level of benefits received in the future. The amount of basic and applied research results available in EC countries, in other countries, and in the international agricultural research centers which can be utilized by CARDI in an adaptive research program will affect the timing and level of benefits from CARDI research. For the analysis in this project paper, a limited number of CARDI personnel were asked about the types of research to be conducted, the potential changes in yields or production costs if research is successful, and the time required to conduct the research.¹ While the information obtained is admittedly crude, it provides a benchmark which can then be subjected to sensitivity analysis.

Information relevant for answering the second and fourth questions related to the demand (timing and spread) for the research results was obtained from both CARDI personnel and an extension specialist.² Geographical spread of research results is very important because the greater the acreage planted and value of production of a particular commodity, the greater the benefits from research.

The third question concerning the social value of the research results is evaluated using standard benefit-cost analysis in which changes in economic (consumer and producer) surplus are calculated which reflect the differing market situations of the individual commodities. Internal rates of

¹ John Hammerton, Research Scientist; Calixhe George, Executive Director of Research for CARDI; and Charles Douglas, Agricultural Economist.

² Dunston Campbell, Extension Specialist for the Winward Islands.

return and net present value of the public research and extension investments are calculated. Distributional effects on producers and consumers as well as employment effects are discussed.

The social evaluation of research benefits requires data or information on quantities produced and traded, farm level prices, domestic and foreign price elasticities of demand, public policies affecting prices or exchange rates, and the potential for demand shifts over time. Research and extension costs, including central administration, must be allocated to the individual commodities for the analysis.

Availability and quality of basic quantity, price and trade data are limited for most agricultural commodities in most of the EC countries. Estimates were made where possible based on recent historical figures from the ministries of agriculture in the different countries and from tables in other studies. When sources conflicted, judgments were made. Again, for several of the commodities, these figures provided a benchmark against which sensitivity analyses could be performed. For other commodities for which data were completely lacking or particularly suspect, no quantitative analysis was conducted. Because the market situations differed by commodity, the procedures for reflecting these differences in the analysis are discussed briefly below.

The first set of commodities analyzed were those listed in Table 1 as being produced for the local market (white potato, cabbage, onion and tomato). The EC currently imports these commodities which are consumed domestically, particularly in the tourist industry, but can do little to affect the world price. Some of these commodities are currently produced on Dominica and St. Lucia, but expanded production of each of these is projected for St. Kitts and Montserrat as a result of the research and extension project, while cabbage and tomato production would

increase on Antigua. The EC market situation for these commodities is illustrated in Figure 1.

The EC pays the world price (P_w) plus transportation costs ($P_e - P_w$) for a local price of P_e . If research generates new technologies and extension helps them become adopted, then the supply curve will gradually shift out (for example from S_1 to S_2 in figure 1) due to lower per unit cost of production (or to a greater yield or area for the same cost). The original quantity supplied is Q_s , quantity demanded is Q_d , and imports are $Q_d - Q_s = Q_t$. The new quantity supplied after the research is Q_s' and imports are reduced to Q_t' . As long as the supply curve does not shift past Q_d , the EC will remain an importer. Of course, Q_d can shift over time as well if domestic demand (D) shifts out due to increases in income, population or the tourist trade. If supply exceeds domestic demand following research, then there will be a range over which price will fall until transportation costs are covered. At this point, the EC could become an exporter of the commodity. For example, the EC currently imports about 2,200 metric tons of onions per year. The EC will remain an importer unless somewhat more than 2,200 additional metric tons are produced.

The gains to research and extension for this type of market can be measured as the area $abcd$ in Figure 1 unless the country increases supply enough to become an exporter. The benefits of research are measured by the formula $CTS = K P_e Q_s (1 + .5Ke)$ where CTS is the change in total economic surplus (which also equals producer gains in this case), K is the proportionate downward shift in the supply curve (per unit cost reduction), and e is the elasticity of supply.

The second set of commodities analyzed were those listed earlier as traditional exports (cocoa and nutmeg) as well as

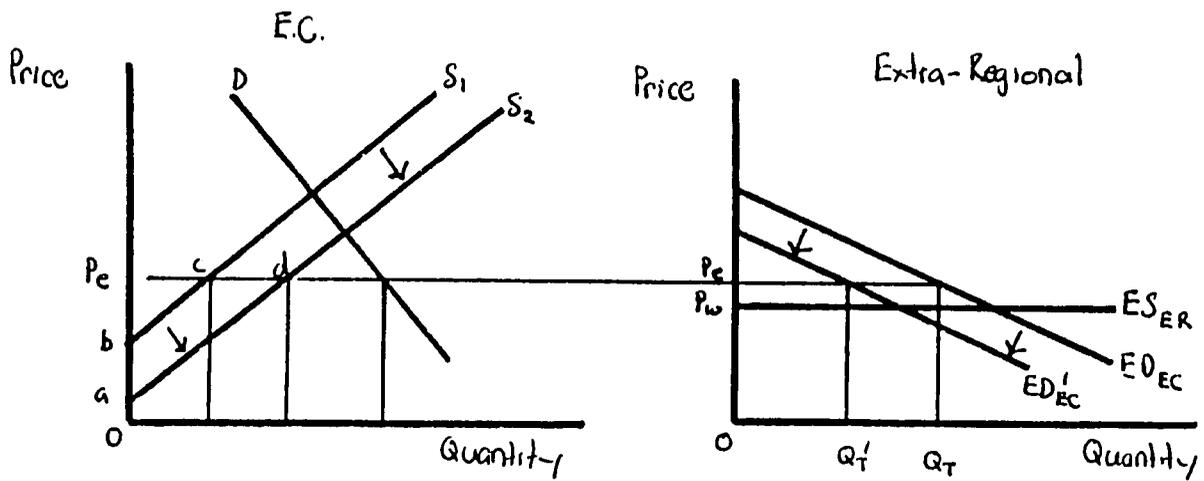


Figure 1. Research and Extension Effects, Small Importer.

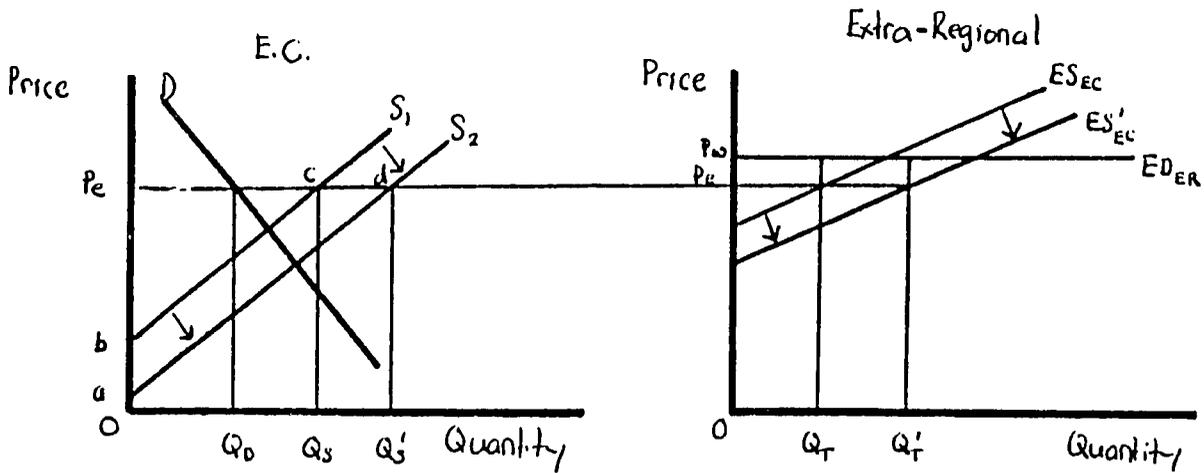


Figure 2. Research and Extension Effects, Small Exporter

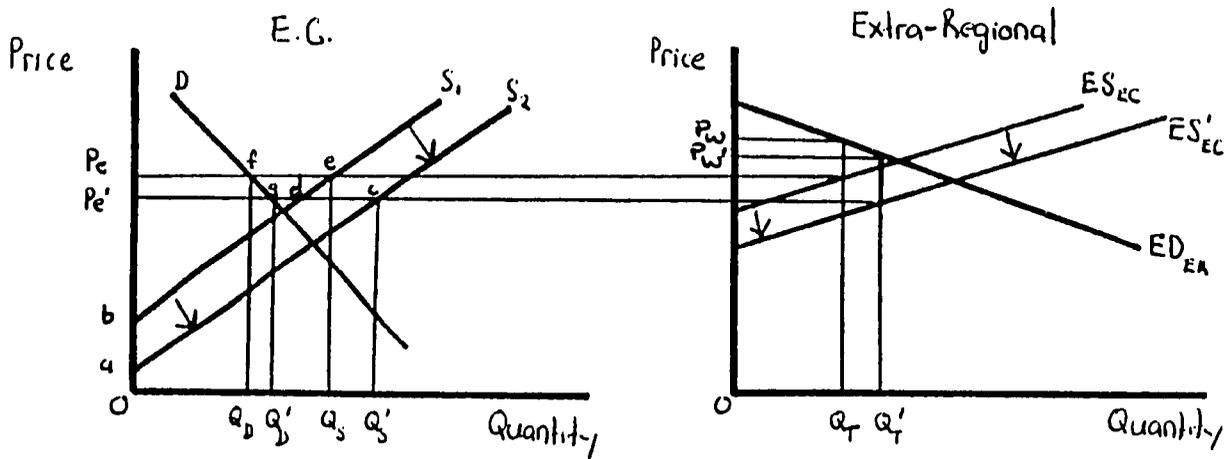


Figure 3. Research and Extension Effects, Large Exporter

ginger and pineapple. Two other traditional exports, bananas and citrus, were not analyzed because the project will not support research on those commodities. WINBAN conducts EC banana research and the U.S. will not support citrus research in the EC because it would generate competition for U.S. citrus growers. The largest cocoa and nutmeg producer is Grenada, while ginger is grown on St. Lucia, St. Vincent, Dominica and Antigua. Pineapple is produced on Antigua, St. Kitts, and St. Lucia. Ginger and pineapple, although non-traditional exports, were grouped with cocoa and nutmeg during the analysis because their market situations more closely resemble the cocoa and nutmeg market situation than those for the non-traditional exports. The EC market situation for cocoa, nutmeg, and ginger is illustrated in Figure 2.

The EC receives the world price (P_w minus transportation costs ($P_w - P_e$) for a local price of P_e . If research shifts the supply out from S_1 to S_2 , then quantity supplied increases from Q_s to Q_s' and exports increase from $Q_s - Q_d = Q_t$ to $Q_s' - Q_d = Q_t'$. Price does not change. Research benefits can be measured as $abcd$ and the same formula for CTS can be used which was described above. This analysis assumes that the domestic cocoa, nutmeg, ginger, and pineapple prices are neither subsidized nor taxed.

The third set of commodities is the largest set, the non-traditional exports (sweet potatoes, yams, dasheen and eddoes, tannia, hot pepper, cucurbits, plantain, papaya, breadfruit, soursop, mango, passion fruit, avocado and grapefruit). These commodities are produced primarily for intraregional trade, but there are some possibilities for extraregional trade to meet an ethnic demand from migrants who have settled in the U.S. and Europe. This is particularly true for the rootcrops. Several of the exotic fruits have a potential overseas market if the quality of the product can be improved and maintained.

Because so much of the market is within the region, or in a small outside market, the EC cannot be considered a small exporter (in a market sense) for these commodities. In other words, there is likely to be some price reduction as supply shifts out as illustrated in Figure 3.

The market in Figure 3 illustrates the effect of research and extension which not only shifts out the supply curve from S_1 to S_2 , increasing supply from Q_S to Q_S' , but also reduces price from P_e to P_e' and increases EC consumption from Q_d to Q_d' . Exports increase from $Q_S - Q_d = Q_t$ to $Q_S' - Q_d' = Q_t'$. Consumers in the EC (including tourists) gain $P_e f g P_e'$, while domestic producers gain $abde - P_e c d P_e'$.³ Note that producers could conceivably either gain or lose. If the extraregional (or EC) demand is very elastic (the demand curves are very flat) producers are likely to gain. Alternative elasticity assumptions are used in the analysis. A more complete model would contain a separate graph for every country in the EC because again, some countries may gain while others lose.

2. Assessment of Net Economic Benefits from Research and Extension

The subset of 13 commodities included in the benefit/cost analysis is listed in Table 2 with estimates of their current normal production, consumption, exports, prices, and values for the 7 EC countries as a group.

The root crops (sweet potatoes, yams, dasheen, eddoes, and tannia) and mango have the highest value of production for the non-traditional export commodities while the total value produced

³ Formulas used to calculate these areas are found in G.W. Norton, P.G. Pardey, J.S. Davis, and J.R. Anderson Priority Setting for Agricultural Research, draft of forthcoming book, ISNAR, The Hague, Netherlands.

Table 2. Estimated Current Normal EC Production, Consumption, Exports, Price, and Value of Production

Commodity	Estimated Seven Country (EC) Production (000kg)	Estimated EC Consumption (000kg)	Estimated EC Exports (000kg)	Estimated Price Per 000kg ¹	Estimated Value ² of Prodn.
cabbage	1380	---	---	2200	3036
tomato	1010	---	---	3000	3030
cocoa	2940	940	2000	1500	13230
nutmeg	3100	100	3000	6000	18600
ginger	1050	550	500	1100	1155
sweet potato	14340	4340	10000	800	11472
yams	12230	10280	2000	1400	17182
dasheen & eddoes	34400	13400	15000	700	24080
tannia	15000	6000	9000	700	10500
hot pepper	220	200	20	2000	440
plantain	9460	3310	1150	400	3784
pineapple	170	170	-	2700	459
mango	3000	5370	20	1200	3600

¹ Farmgate price in EC \$

² Million EC \$

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of the two traditional exports (cocoa and nutmeg) also is relatively high.

Estimates of intraregional and cross-price elasticities of supply and demand used in the analysis are shown by commodity in Table 3. These elasticities reflect the market situations depicted earlier in Figures 1-3. Cocoa, nutmeg, ginger, and pineapple are considered to face perfectly elastic demand curves in extraregional markets while other exports face elastic but less than perfectly elastic demand curves. Cabbage and tomatoes face perfectly elastic excess supply curves in import markets. The questionnaire used to obtain the information needed to project shifts in supply curves due to research and extension is presented in Table 4 and selected raw results from the questionnaire are summarized in Table 5. The projected proportionate cost reductions, probabilities of research success, research lags, adoption profiles, and expected area expansions were combined to produce the baseline estimates of proportionate cost reductions due to research and extension shown in Table 6.

The research and extension budgets were apportioned by commodity to enable calculations of net present values and internal rates of return to those expenditures. The projected research and extension expenditures by commodity shown in Table 7 are rough estimates based on information provided by the Executive Director of Research for CARDI.

The information in Tables 2, 3, and 6 were entered into computer spreadsheets along with appropriate formulas to calculate changes in total economic surplus (benefits), consumer surplus (benefits), and producer surplus (benefits), and producer surplus (benefits) by year, by commodity (see Table 8). Total economic benefits were combined with the projected research costs in Table 7 to calculate the projected net present value

Table 3. Estimates of Intraregional and Excess Price Elasticities of Supply and Demand

Commodity	EC Intraregional Price Elasticity of Supply	EC Intraregional Price Elasticity of Demand	EC Excess Supply Elasticity	Extraregional Excess Supply Elasticity ¹	Extraregional Excess Demand Elasticity ²
Cabbage	.5	NA ³	NA	∞	NA
tomatoes	.5	NA	NA	∞	NA
cocoa	.1	NA	NA	NA	∞
nutmeg	.1	NA	NA	NA	∞
ginger	.5	NA	NA	NA	∞
sweet potatoes	.5	.5	1.5	NA	10.0
yams	.5	.5	.9	NA	10.0
dasheen & eddoes	.5	.5	1.5	NA	10.0
tannia	.5	.5	1.2	NA	5.0
hot peppers	.5	.5	10.0	NA	10.0
plantain	.4	.6	1.1	NA	5.0
pineapple	.3	1.5	10.0	NA	∞
mango	.1	1.5	4.7	NA	∞

¹ EC Excess supply elasticity (e_x) calculated as:
 $e_x = e(s/x) + n(D/x)$ where s = EC supply, D = EC demand, x = EC exports, e = EC intraregional price elasticity of supply, and n = EC intraregional price elasticity of demand.

² Extraregional excess demand elasticity (n_{XR}) calculated as:
 $n_{XR} = -e_R(S/X) - n_R(S_R/X)$ where S is supply outside the EC, P_R is demand outside the EC, X = EC exports, and e_R and n_R are average supply and demand elasticities for the commodity outside the EC.

³ NA = not needed for analysis

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Table 4. Researcher and Extension Worker Questionnaire

Researcher: all questions
Extension: questions 1,2,4,7,8 and 9

Commodity _____

- (1) Describe the type of research anticipated: _____
- (2) Expected proportionate cost reduction or yield increase if research is successful
- | | | | | | |
|-----------|-------|-----------|-------|---------------|-------|
| old cost | _____ | new cost | _____ | %(Δ) | _____ |
| old yield | _____ | new yield | _____ | %(Δ) | _____ |
- (3) Estimated probability of research success _____
- (4) Amount and cost of additional inputs required by new variety or practice
- | | Amt. | Cost | Amt. | Cost |
|------------|-------|-------|---------|-------|
| fertilizer | _____ | _____ | _____ | _____ |
| pesticides | _____ | _____ | _____ | _____ |
| labour | _____ | _____ | _____ | _____ |
| | | | mach. | _____ |
| | | | storage | _____ |
| | | | irrig. | _____ |
- (5) When will research results be available to farmers? _____
- (6) Effect of research on product quality
- higher _____ lower _____ no effect _____
- (7) Do you expect the variety or practice to degenerate or become less effective over time?
- yes _____ no _____ when _____
- (8) Proportion of farmers (area) expected to adopt variety or practice once released with and without extension
- | | with ext. | w/out ext. | | with ext. | w/out ext. |
|--------|-----------|------------|---------|-----------|------------|
| year 1 | _____ | _____ | year 6 | _____ | _____ |
| year 2 | _____ | _____ | year 7 | _____ | _____ |
| year 3 | _____ | _____ | year 8 | _____ | _____ |
| year 4 | _____ | _____ | year 9 | _____ | _____ |
| year 5 | _____ | _____ | year 10 | _____ | _____ |
- (9) Will area planted to crop variety or practice increase after research?
- yes _____ no _____
- If expansion, will it be new area or replace other crops? _____

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Table 5. Selected Results From Research and Extension Worker Questionnaire

	cabbage	tomato	cocoa	nutmeg	ginger	sweet potato	yams	dasheen	eddoes	tannia	hot pepper	plantain	pineapple	mango
1. Proportionate cost reduction if research is successful	.2	.19	.15	.15	.16	.27	.23	.19	.17	.25	.20	.17	.25	.20
2. Probability of research success	.75	.75	.70	.75	.75	.80	.90	.70	.70	.70	.75	.95	.85	.90
3. When research results will be available (yrs)	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4. Adoption rates once research results are available ¹														
year 1	25	10	10	5	3	5	10	5	5	5	30	5	2	2
year 2	40	18	15	10	10	10	15	10	10	10	45	15	4	4
year 3	50	25	25	15	17	15	25	15	15	15	65	22	6	6
year 4	65	40	35	25	25	20	30	20	20	20	70	35	15	12
year 5	75	50	40	30	30	30	40	25	25	25	90	42	30	30
year 6	75	60	40	35	35	35	45	32	32	32	80	50	60	55
year 7	75	70	45	40	40	45	45	40	40	40	90	60	60	70
year 8	75	70	50	45	40	50	45	45	45	45	90	60	60	40
year 9	75	70	50	45	40	50	45	45	45	45	90	60	60	40
year 10	75	70	50	45	40	50	45	45	45	45	90	60	60	40
5. Expected area expansion (% new area)											200	50	100	

¹ Percent of area affected (with extension)

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Table 6. Annual Proportionate Cost Reduction Due to Research and Extension

Year	cabbage	tomatoes	cocoa	nutmeg	ginger	sweet potato	yam	dasheen & eddoes	tannia	hot pepper	plantain	pineapple	mango
1989	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	.034	.0143	.01	.006	.0034	.011	.021	.006	.009	.045	.008	.004	.004
1992	.06	.0257	.02	.01	.0113	.022	.033	.013	.018	.068	.022	.008	.007
1993	.075	.0356	.03	.016	.0191	.032	.052	.019	.026	.098	.035	.013	.011
1994	.10	.057	.04	.028	.0291	.043	.062	.025	.036	.105	.057	.032	.022
1995	.11	.0713	.042	.034	.0338	.065	.083	.032	.044	.12	.068	.064	.036
1996	.10	.0855	.044	.039	.0394	.076	.093	.040	.056	.12	.081	.1275	.045
1997	.095	.0998	.047	.045	.045	.097	.091	.050	.07	.12	.10	.1275	.054
1998	.090	.0998	.053	.056	.045	.108	.090	.057	.078	.12	.10	.1275	.072
1999	.085	.0995	.055	.053	.043	.106	.029	.056	.076	.11	.09	.11	.072
2000	.080	.0993	.050	.051	.042	.105	.088	.056	.075	.10	.08	.10	.070
2001	.075	.099	.047	.049	.040	.104	.087	.056	.073	.099	.07	.09	.067
2002	.070	.097	.044	.048	.039	.103	.086	.053	.072	.097	.06	.08	.063
2003	.065	.095	.041	.047	.038	.102	.085	.052	.070	.096	.05	.07	.060
2004	.060	.093	.038	.046	.036	.101	.084	.051	.068	.094	.04	.06	.055
2005	.055	.090	.035	.045	.035	.10	.083	.050	.067	.093	.03	.05	.05
2006	.050	.087	.030	.043	.033	.09	.082	.049	.065	.092	.02	.04	.045
2007	.045	.084	.025	.040	.032	.08	.081	.047	.064	.091	.01	.03	.04
2008	.040	.080	.020	.038	.031	.07	.080	.045	.063	.090	0	.02	.035

1 (proportionate cost reduction if research is successful) X (probability of research success) X (adoption rate)

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Table 7. Projections of Research and Extension Expenditures by Commodity

Commodity	Year 1		Year 2		Year 3		Year 4		Year 5	
	%	Amt ¹	%	Amt	%	Amt	%	Amt	%	Amt
<u>Local Market</u>										
cabbage	1	21	1	22	1	21	1	18.5	1	17.5
tomatoes	1	21	1	22	1	21	1	18.5	1	17.5
other crops ²	42	882	40	880	37	777	34	629	31	542.5
livestock	22	462	22	484	22	462	22	407	22	385.0
subtotal	66	1386	64	1408	61	1281	58	1073	55	962.5
<u>Traditional Exports</u>										
cocoa	3	63	3	66	3	63	3	55.5	3	52.5
nutmeg	2	42	2	44	2	42	2	37.0	2	35.0
subtotal	5	105	5	110	5	105	5	92.5	5	87.5
<u>Non-traditional Exports</u>										
ginger	1	21	1	22	2	42	3	55.5	3	52.5
sweet potatoes	3	63	4	88	4	84	4	74	4	70
yams	10	210	9	198	8	168	8	148	8	140
dasheen, eddoes and tannia	4	84	5	110	5	105	5	92.5	5	87.5
hot pepper	1	21	1	22	1	21	1	18.5	1	17.5
plantain	3	63	3	66	4	84	4	74	4	70
papaya	1	21	1	22	2	42	2	37.0	2	35
pineapple	1	21	1	22	2	42	2	37.0	2	35
mango	4	84	4	88	5	105	6	111	6	105
passion fruit	1	21	1	22	2	42	2	37.0	2	35.5
other non-trad. ³	1	21	1	22	2	42	2	37.0	2	35
subtotal	29	609	31	682	37	777	39	721.5	41	710
total	100	2100	100	2200	100	2111	100	1850	100	1770

¹ 000 US\$

² onions, carrots, white potatoes, others

³ cucumbers, melons, breadfruit, soursop

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Table 8. Change in Consumer Surplus, Change in Producer Surplus and Change in Total Economic Surplus Resulting from Research and Extension Investments by Commodity¹

Year	Cabbage			Tomato			Cocoa			Nutmeg			Ginger			Sweet Potato			Years		
	CS	PS	TS	CS	PS	TS	CS	PS	TS	CS	PS	TS	CS	PS	TS	CS	PS	TS	CS	PS	TS
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	.11	.11	0	.04	.04	0	.003	.003	0	.11	.11	0	.004	.004	.002	.12	.12	.09	.28	.36
1992	0	.19	.19	0	.08	.08	0	.007	.007	0	.19	.19	0	.01	.01	.01	.24	.25	.13	.47	.61
1993	0	.24	.24	0	.11	.11	0	.02	.02	0	.30	.30	0	.02	.02	.02	.35	.37	.21	.81	1.02
1994	0	.33	.33	0	.18	.18	0	.05	.05	0	.52	.52	0	.03	.03	.02	.48	.50	.25	1.03	1.29
1995	0	.36	.36	0	.23	.23	0	.15	.15	0	.64	.64	0	.04	.04	.03	.73	.76	.34	1.48	1.82
1996	0	.33	.33	0	.28	.28	0	.30	.30	0	.73	.73	0	.05	.05	.04	.87	.91	.37	1.38	2.15
1997	0	.31	.31	0	.33	.33	0	.30	.30	0	.84	.84	0	.05	.05	.05	1.12	1.17	.37	1.76	2.13
1998	0	.29	.29	0	.33	.33	0	.30	.30	0	1.05	1.05	0	.05	.05	.05	1.27	1.32	.36	1.71	2.19
1999	0	.27	.27	0	.32	.32	0	.26	.26	0	.99	.99	0	.05	.05	.05	1.25	1.30	.36	1.71	2.07
2000	0	.26	.26	0	.32	.32	0	.23	.23	0	.96	.96	0	.05	.05	.05	1.24	1.29	.35	1.68	2.03
2001	0	.24	.24	0	.32	.32	0	.21	.21	0	.92	.92	0	.05	.05	.05	1.22	1.28	.35	1.66	2.00
2002	0	.22	.22	0	.31	.31	0	.19	.19	0	.90	.90	0	.05	.05	.05	1.21	1.26	.35	1.63	1.98
2003	0	.21	.21	0	.31	.31	0	.16	.16	0	.88	.88	0	.04	.04	.05	1.20	1.25	.34	1.60	1.95
2004	0	.19	.19	0	.30	.30	0	.14	.14	0	.86	.86	0	.04	.04	.05	1.19	1.24	.34	1.58	1.92
2005	0	.17	.17	0	.29	.29	0	.12	.12	0	.84	.84	0	.04	.04	.05	1.17	1.22	.33	1.55	1.89
2006	0	.16	.16	0	.28	.28	0	.09	.09	0	.80	.80	0	.04	.04	.05	1.05	1.10	.32	1.53	1.86
2007	0	.14	.14	0	.27	.27	0	.07	.07	0	.75	.75	0	.04	.04	.04	.93	.97	.32	1.52	1.83
2008	0	.13	.13	0	.26	.26	0	.05	.05	0	.71	.71	0	.04	.04	.04	.80	.84	.32	1.48	1.80

¹ Changes in consumer surplus (CS), producer surplus (PS) and total economic surplus (TS) are in millions of current EC \$.

Table 8. (continued) Change in Consumer Surplus, Change in Producer Surplus and Change in Total Economic Surplus Resulting from Research and Extension Investments by Commodity

Year	Dasheen & Eddoes			Tannia			Hot Pepper			Plantain			Pineapple			Mango		
	CS	PS	TS	CS	PS	TS	CS	PS	TS	CS	PS	TS	CS	PS	TS	CS	PS	TS
1989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	.007	.13	.14	.005	.08	.09	.005	.02	.02	.001	.03	.03	0	.003	.003	-	.04	.04
1992	.02	.29	.30	.01	.17	.18	.007	.03	.04	.004	.07	.07	0	.007	.007	-	.07	.07
1993	.02	.42	.45	.01	.24	.25	.01	.05	.06	.007	.12	.12	0	.02	.02	.001	.10	.10
1994	.03	.56	.59	.02	.34	.36	.01	.05	.06	.01	.19	.20	0	.06	.06	.003	.21	.21
1995	.04	.73	.77	.02	.41	.44	.01	.06	.08	.01	.23	.24	0	.15	.15	.003	.35	.35
1996	.05	.92	.97	.03	.53	.56	.01	.07	.08	.02	.28	.30	0	.30	.30	.004	.43	.44
1997	.06	1.16	1.22	.04	.67	.71	.01	.07	.08	.02	.35	.37	0	.30	.30	.006	.52	.53
1998	.07	1.34	1.41	.04	.75	.80	.01	.07	.08	.02	.35	.37	0	.30	.30	.006	.70	.71
1999	.07	1.33	1.39	.04	.74	.78	.01	.06	.07	.02	.32	.33	0	.26	.26	.006	.70	.71
2000	.07	1.35	1.42	.04	.73	.77	.01	.05	.06	.02	.28	.29	0	.23	.23	.005	.68	.69
2001	.07	1.33	1.39	.04	.71	.75	.01	.05	.06	.01	.24	.25	0	.21	.21	.005	.65	.66
2002	.06	1.25	1.32	.04	.69	.74	.01	.05	.06	.01	.20	.21	0	.19	.19	.005	.61	.62
2003	.06	1.22	1.29	.04	.67	.71	.01	.05	.06	.01	.17	.18	0	.16	.16	.004	.58	.59
2004	.06	1.20	1.26	.04	.66	.69	.01	.05	.06	.008	.13	.14	0	.14	.14	.004	.53	.54
2005	.06	1.17	1.23	.04	.64	.68	.01	.05	.06	.006	.10	.11	0	.12	.12	.004	.48	.49
2006	.06	1.15	1.21	.04	.62	.66	.01	.05	.06	.004	.07	.07	0	.09	.09	.003	.44	.44
2007	.06	1.10	1.16	.04	.61	.65	.01	.04	.05	.002	.03	.03	0	.07	.07	.003	.39	.39
2008	.05	1.05	1.10	.04	.60	.64	.01	.04	.05	.001	.02	.02	0	.05	.05	.003	.34	.34

¹ Changes in consumer surplus (CS), producer surplus (PS) and total economic surplus (TS) are in millions of current EC \$.

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(discounted at 10%), and the internal rates of return to research and extension (see Table 9). The results of the questionnaire and the benefit/cost analyses are summarized below by commodity.

Cabbage: Research and extension on cabbage will be aimed primarily at controlling Black Rot Disease and the Cabbage Diamond Back moth. Researchers project a large (20%) per unit cost reduction if this is successful, a 75% probability of research success, and broad and rapid adoption of research results (75% of the area affected by 5 years after the research results are released). The projected rate of return to research and extension is higher on cabbage (83%) than on any other commodity. This high rate of return is due to the factors mentioned above, to relatively low research costs, and to the fact that research is already underway on the disease and moth problems. In that sense, research costs are underestimated because they do not include prior research costs. However, without the new project, the research problems would not be solved and therefore the marginal return to new research dollars invested is quite high. Producers are the primary beneficiaries of the displaced cabbage imports.

Tomato: Research and extension on tomato will be aimed primarily at varietal selection for seasonal production, pest and disease control, and improved fertilizer practices. Researchers project a 19% per unit cost reduction if the research is successful, a 75% probability of research success, and relatively broad adoption of research results (70% by year 7 after the research results are released). A relatively high rate of return to research and extension is predicted (53%). This high rate of return is due to the factors mentioned above and the fact that researchers can build both on previous research and on research results in other countries. Producers are the primary beneficiaries of the displaced tomato imports.

Table 9. Net Present Value and Internal Rate of Return to Research and Extension by Commodity

Commodity	Internal Rate of Return (%)	Net Present Value Discounted at 10%(millionEC\$)
cabbage	83	1.42
tomatos	53	1.28
cocoa	50	2.60
nutmeg	65	3.80
ginger	3	-.13
sweet potatoes	49	4.46
yams	41	6.63
dasheen & eddoes	70	5.14
tannia	49	2.67
hot pepper	18	0.12
plantain	31	0.53
pineapple	28	0.60
mango	24	1.40

Table 10. Results of Sensitivity Analysis

Internal Rate (%) of return when:	cabbage	tomatoes	cocoa	nutmeg	ginger	sweet potatoes	yams	dasheen	tannia	hot pepper	plantain	pineapple	mango
1. original	83	53	50	65	3	49	41	70	49	18	21	28	24
2. proportionate cost reduction is halved ¹	46	32	29	41	neg. ²	30	22	44	30	5	8	16	13
3. price is 25% lower	67	44	40	54	neg.	41	33	58	40	13	15	23	17
4. proportionate cost reduction is halved and price is 25% lower	36	35	22	34	neg.	24	16	36	24	0	3	11	9

¹ In all cases it was predicted that adoption rates would be at least 50% lower without extension.

² neg. - negative

Cocoa: Research and extension on cocoa will be aimed primarily at controlling Witches Broom and Black Pod and at a series of cultural practices (pruning, fertilizer, drainage). Researchers predict a 15% per unit cost reduction if the research is successful, a 70% probability of research success, and a 50% adoption rate by year 8 after the research results are released. The projected internal rate of return to research and extension is 50%. This high rate of return is influenced by the high per unit price for this commodity compared to most of the other commodities. Producers will be the primary direct beneficiaries of the additional cocoa exports.

Nutmeg: Research and extension on nutmeg will be aimed primarily at cultural practices and fungal diseases (particularly Rosellinia). Researchers predict a 15% per unit cost reduction if research is successful, a 75% probability of research success, and a 45% adoption rate by year 8 after the results are released. The projected internal rate of return to research and extension is 65%, reflecting the very high per unit price for this commodity compared to all of the other commodities. Producers will be the primary beneficiaries of the additional nutmeg exports.

Ginger: Research and extension on ginger will be aimed primarily at developing standard technical packages related to herbicide use, varieties, pest and disease control, and post-harvest handling. Researches predict a 16% per unit cost reduction, a 75% probability of research success, and a 40% adoption rate by year 7 after the research results are released. The projected internal rate of return to research and extension is only 3%, which indicates that ginger research and extension is a relatively unprofitable public investment. This low return is due in part to the relatively low current production of ginger combined with relatively high research costs. Research may lead

to some quality improvements which would increase the return to ginger research, but the extent of these quality improvements are difficult to predict.

Sweet Potato: Research and extension on sweet potato will be aimed at varietal selection for weevil control, cultural practices, and harvesting and post-harvest techniques. Researchers predict a relatively large 27% per unit cost reduction, an 80% probability of research success, and a 50% adoption rate by year 8. The projected internal rate of return to research and extension is 49%. Both producers and consumers benefit, but producers receive a high proportion of the benefits.

Yams: Research and extension on yams will be aimed at disease control through chemical and varietal selection, local management, fertilizer management, demonstrating use of miniset techniques, and investigating the effects of staking on yields. A projected 23% per unit cost reduction is predicted with an estimated 90% probability of research success and a 45% adoption rate by year 6 after research results are released. The projected internal rate of return to research and extension is 41%, with benefits going to both producers and consumers. Brazil and Jamaica are the largest competitors in the ethnic export market for yams in Europe.

Dasheen and eddoes: Research and extension on dasheen and eddoes will be aimed primarily at validating improved production practices, pest and disease control, and harvest and post-harvest techniques. Researchers project an 18% per unit cost reduction due to research and extension, a 70% probability of research success, and a 45% adoption rate by year 8 if research is successful. The projected internal rate of return to research and extension is a relatively high 70%. This high rate is due in part to the very large production base over which the research

and extension results will spread. The additional production would be exported, in part, to the ethnic markets of Europe and North America with producers receiving more benefits than EC consumers.

Tannia: Research and extension on tannia will be aimed at validating weed management systems, post-harvest technologies, and methods for controlling Tannia Leaf Burning disease. A relatively large (25%) per unit cost reduction is predicted by researchers, with a 70% probability of research success and a 45% adoption rate by year 8 if the research is successful. An internal rate of return of 49% is predicted which is lower than the returns to research on dasheen and eddoes, but still relatively high. If efforts to control Tannia Leaf Burning Disease are not successful, then returns to other research activities may also be somewhat lower. The ethnic export market will be important for tannia, and research and extension benefits would go more to producers than consumers.

Hot Peppers: A large variety of research needs exist for hot pepper: varietal selection, improved irrigation technologies, cultural practices, disease control, and others. Researchers predict a 20% per unit cost reduction if research is successful, a 75% probability of research success, and a relatively high (80%) adoption rate by year 5 after research results are released. The predicted internal rate of return to research, however, is relatively low (18%) compared to other commodities, because research results would spread over a relatively small production base and because research costs would be relatively high given the variety of research problems. The hot pepper market is mostly in North America and Europe and will probably grow relatively slowly. Producers would receive a higher proportion of research benefits than consumers.

Plantain: Research on plantain will focus on management practices, especially nematicide and insecticide application rates, fertilizer application rates, pruning and post-harvest technologies. Researchers predict a 17% per unit cost reduction if research is successful, a very high (95%) probability of research success, and an adoption rate of 60% by year 7 after research is complete. It was felt that acreage would also expand by 50% if research is successful. The projected annual internal rate of return is 21%, which is relatively low compared to several other commodities. This low rate is due to the relatively high budget needed to achieve these research results.

Pineapple: Research and extension on pineapple would focus on validation and demonstration of cultural practices, methods for speeding propagation of planting material, methods of inducing flowering, and post-harvest handling. Researchers predict a 25% per unit cost reduction of research success, and a 60% adoption rate by year 6. The projected annual internal rate of return to research and extension is 28%. Achieving this return, however, is contingent upon a five-fold area expansion as current production of pineapple is relatively small in the EC. Producers are the major beneficiaries of the research.

Mango: Research and extension on mango would focus on cultural practices, introduction of selected varieties, post-harvest technologies, and Anthracnose control. Researchers predict a 20% per unit cost reduction if research is successful, a 90% probability of research success, and a 40% adoption rate by year 8 after the research is completed. The projected annual internal rate of return to research and extension is 24%, which is lower than the returns to several of the other commodities because of the relatively high projected research cost. Europe and the United States would be important export markets.

Sensitivity Analysis: Two key assumptions, the expected proportionate cost reduction due to research and extension, and the expected prices, were allowed to vary to test the sensitivity of the predicted rates of return to agricultural research and extension (see Table 10). When the projected proportionate cost reduction was halved, rates of return were roughly halved (exact rates depended on the distribution of benefits over time). A halving of the probability of research success or of adoption rates would have resulted in the same effect. When prices were reduced by 25%, rates of return were also reduced by roughly that proportion. Even when the projected proportionate cost reduction and projected prices are both reduced, research and extension on several of the commodities remain profitable public investments.

Elasticities were not varied but rates of return to research are not very sensitive to these elasticities. However, the distribution of benefits between producers and consumers is sensitive, particularly to the demand elasticity. The more elastic the elasticity of demand, the greater the proportion of benefits accruing to producers as compared to consumers.

3. Summary and Conclusions

The representative benefit/cost analyses presented above suggest relatively high rates of return on public investments in agricultural research and extension in the seven Eastern Caribbean countries. These rates under a set of baseline assumptions range from 3% to 83% with a median return of 49%. Even if projected per unit cost reductions due to research are halved, the projected returns are still high enough to justify public support in the aggregate, although CARDI needs to carefully plan its allocation of funds as benefits differ substantially by commodity and type of research. The net present value of research and extension needs to be examined as well as the internal rates of return, because commodities with equal

rates of return can have sizable differences in net present values. Sweet potato and cocoa, for example, have similar rates of returns to research and extension, but sweet potato has a much larger net present value because its value of production is greater.

Another important and very important economic benefit resulting from CARDI research and its extension will result from the maintenance of current production levels and costs. Even if no yield increases or per unit cost reductions are realized due to research and extension, if current yields and per unit costs are stopped from deteriorating as insects and diseases evolve and attack the commodities, then the research and extension will have generated substantial benefits. Evidence from other countries indicate that the maintenance of current yields accounts for about one-third of the benefits from agricultural research.

In addition to the direct economic impacts due to yield increases on per unit cost reductions, research and extension can affect employment, product quality, nutrition, foreign exchange, and industrial development. Because all of the commodities being considered are exported or imported, price reductions due to research and extension-induced supply shifts are relatively small. Consequently, research and extension can have positive effects on employment within the agricultural sector because total agricultural revenue increases as supply shifts out. Furthermore, researchers indicated that quality effects would result from the research on several commodities and these effects are not fully captured in the rates of return presented earlier. Nutrition effects will result primarily from the higher agricultural incomes. Additional foreign exchange earnings will help pay foreign debts and stimulate overall economic development.

The internal rates of return presented earlier reflect the effects of both research and extension efforts. The questionnaire in Table 4 was also used to obtain information on research adoption rates with and without extension. For most commodities, extension expenditures both increased the speed of adoption and in most cases, doubled the predicted adoption rates.

Finally, the results of the analysis in this annex provide some guidance to help track the success of the proposed research and extension project both during and at the end of the five year project. While most of the research results are not projected for release until year 3, mid-term evaluators should question researchers about their progress in developing the new cultural practices, disease and insect controls, post-harvest techniques, etc. CARDI should continue to generate detailed information on the production costs associated with these improved technologies (and any price differentials due to quality changes). Then in the latter years of the project, adoption rates associated with new technologies should be examined and the same spreadsheets used to reevaluate the benefits from the research. While many of the benefits would be yet to come after 5 years, a much more accurate picture of per unit cost reductions, probabilities of research success, and adoption rates for the early years, would be available. These spreadsheets can also be used on a periodic basis during the project when CARDI or UWI needs to justify their allocation of research funds to EC policymakers who may be suggesting alternative allocations of research and extension funds.

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D C 20523

LAC-IEE-89-03

ENVIRONMENTAL THRESHOLD DECISION

Project Location : Caribbean Regional

Project Title : Development of Agricultural
Research and Extension in the
Eastern Caribbean (DAREEC)

Project Number : 538-0164

Funding : \$5.0 million (grant)

Life of Project : Five years (FY 89-93)

IEE Prepared by : RDO/C Bridgetown

Recommended Threshold Decision : Negative Determination

Bureau Threshold Decision : Concur with Recommendation

Comments : Other than for research as
described in the IEE and covered
under Section 216.3(b)(2)(iii),
no pesticides may be procured or
used under the project without
first amending the IEE and
receiving LAC Chief Environmental
Officer approval.

Copy to : James S. Holtaway, Director
USAID/Bridgetown

Copy to : Rebecca J. Niec, USAID/Bridgetown

Copy to : Patricia Buckles, LAC/DR/CAR

Copy to : Andre DeGeorges, REMS/CAR

Copy to : IEE File

James S. Hester Date NOV 8 1988

James S. Hester
Chief Environmental Officer
Bureau for Latin America
and the Caribbean

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INITIAL ENVIRONMENTAL EXAMINATION

Project Location : Caribbean Region

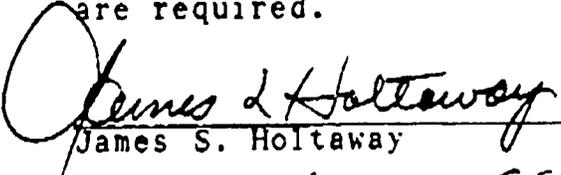
Project Title : Development of Agricultural
Research and Extension in the
Eastern Caribbean

Life of Project : 5 years (FY 89-90)

LOP Funding : \$5.0 million (grant)

IEE prepared by : Agricultural and Rural
Development Office, RDO/C

Environmental Action
Recommended : Negative Determination. No
further environmental studies
are required.

Mission Director's
Concurrence : 
James S. Holtaway


Date

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Project Description

The purpose of the project is to strengthen the institutional capability of regional research and extension organizations to generate, develop, adapt and disseminate continuing streams of improved agricultural technologies (varieties/species and management practices) which are responsive to the needs of participating countries and are widely adopted at the farm level. The strategy is to improve the long-term effectiveness of the Caribbean Agricultural Research and Development Institute (CARDI), to develop and adapt improved technologies and to improve the long-term effectiveness of the Department of Extension of the University of the West Indies (UWI) to backstop and support national extension services, integrating the extension function of the participating national extension services more closely with research throughout the region.

The project will fund selected technical and support staff, minor research and training facilities renovation and improvement, training and workshops and technical collaboration/consultancies.

Environmental Impact:

Most of the project activities involve education, training and technical assistance for institution building purposes. These inputs will enhance the region's capability to utilize its resources in environmentally sound ways through the introduction of improved agricultural technologies. These activities have no appreciable direct environmental impact and 22 CFR 216.2(c)(2)(i) provides a "categorical exclusion" that excludes them from the need for further environmental review. This project includes some research and training facility renovation which is not part of the categorical exclusion mentioned above. These improvements will be minor and will be located in previously developed areas and therefore, will have negligible environmental impacts.

Another major category of project activities is agricultural research. According to 22 CFR 216.2(c)(2)(ii) these activities also are excluded from additional environmental review because they will be confined to small areas and will be carefully monitored and controlled.

This project will provide support to the integrated pest management (IPM) activity of CARDI and as such should lead to a reduction in the overall volume of pesticide use, decreased impacts on non-target populations and fewer residuals found in

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animal and plant tissue and in run-off or ground water. The IPM program also will include training in pesticide use and safety. For the IPM activity, small quantities of pesticides may be procured for laboratory research. This is permissible without additional environmental review under the "Exceptions to Pesticides Procedures" of 22 CFR 216.3(b)(2)(iii).

The project should have a beneficial impact as extension agents assist farmers to put into practice technology packages generated through research activities. Extension agents will be encouraged to promote agricultural practices which are consistent with sound environmental management and in so doing support an objective of permanently sustainable agricultural production.

Recommendation for Environmental Action

Because of the nature and scale of the activities, this project will not have a significant adverse effect on the environment. A "Negative Determination" is recommended.

RESEARCH AND TRAINING CENTER RENOVATION/CONSTRUCTION1. RESEARCH/TRAINING CENTER - ST. LUCIA

The Research/Training Center is being developed to:

- a) conduct research on certain non-traditional crops with emphasis on fruits such as plantain, pineapple, papaya, carambola, passion fruit;
- b) testing the commercial viability of technological packages developed from activities of (a), above;
- c) sensitize farmers to adopt these technological packages.

The operations of the center will be the direct responsibility of the Polologist. However scientists of various disciplines will have inputs into the integration of the production and technological systems developed and will interact with farmers either directly or through extension agents.

Facilities are required for:

- a) Technology Generation
- b) Commercial Testing
- c) Technology Transfer

The following modest facilities are envisaged:

- | | |
|--|-------------|
| a) <u>Technology Generation</u> | US\$ 71,000 |
| Propagation Bins; Tissue Culture Reception/Multiplication/
Hardening Greenhouse; Greenhouse for Crop Protection
Work, Storage for Agrochemicals, Equipment Field Laboratory
for general horticultural research and development
activities, Office space for Pomologist and assistants. | |
| - <u>Greenhouses & Propagation Facilities</u> - Block walls to 48"
above ground; remainder in netting, greenheart timber frame
and translucent roof sheeting; concrete floor and bins. | |
| 1440 sq.ft x US\$25 sq.ft | US\$ 36,000 |
| - <u>Field Laboratory Building</u> (with office & storage space for
1) Equipment, 2) Agrochemicals. | |
| - Single storey concrete block wall construction, timber
frame, metal roof. | |
| 1000 sq.ft x US\$35/sq.ft | US\$ 35,000 |

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b) <u>Commercial Testing</u>		US\$ 55,000
Initial farm development, fencing, drainage, infrastructure - roads. Permanent crop establishment.		
Post harvest packing/handling and storage area with chill rooms.		
- <u>Farm Development</u>		US\$ 20,000
Drainage	5,000	
Soil conservation works	5,000	
Road works	10,000	
- <u>Post Harvesting Facilities</u>		
Single storey shed with concrete base and metal roof, open sided; conveyor belt system for sorting, grading and packing product; plus Single storey concrete building with cold <u>storage/chill rooms properly insulated</u> 1000 sq.ft x US\$35/sq.ft		
		US\$ 35,000
c) <u>Technology Transfer</u>		US\$ 17,500
Training/demonstration room plus office		
- Single storey concrete block wall construction timber frame, metal roof with lecture room and office. 500 sq.ft x US\$35 sq.ft.		US\$ 17,500
2. <u>Research/training Center - St. Vincent</u>		US\$ 64,500
Concentrating on Root Crops		
- Field laboratory 1000 sq.ft x US\$35/sq.ft	35,000	
- Tissue culture greenhouse 480 sq.ft x US\$25/sq.ft	12,000	
- Training/demonstration room 500 sq.ft x US\$35/sq.ft	17,500	
3. <u>Research/training Center - Antigua</u>		US\$ 42,000
- Training/demonstration room 500 sq.ft x US\$35 sq.ft	17,500	
- Upgrading office at Friar's Hill	24,500	
Total		<u>US\$250,000</u>

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ILLUSTRATIVE PROCUREMENT LIST

RESEARCH EQUIPMENT

1.

	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>COST</u>
Tractor 90HP 4WD	1	20,000	20,000
Disc Plough 3 tyne	1	1,500	1,500
Brushcutter	1	2,000	2,000
Disc Harrow	1	1,600	1,600
Tilt Trailer	1	1,260	1,260
Mist Blower	3	450	1,350
Root crop planter	1	2,000	2,000
Knapsack sprayers	4	300	1,200
Heavyduty platform scales	3	800	2,400
Heavyduty hanging scales	2	390	780
Dipping tanks	6	250	1,500
Cold storage cabinets	2	4,900	9,800
Electronic balance-top loading	1	3,500	3,500
Gas analysers	3	100	300
Refractometer (1 hand held)	2	2,900 +750	3,650
Crates (Rubbermaid)	10 cs.	60	600
Microcomputer	1	4,000	4,000
Printer	1	1,500	1,500
Shelving material			1,500
Fruit sorters	2	600	1,200
Ladders	2	600	1,200
Small tools and equipment (Secateurs, pruning saws, budding knives, wheel barrows small hanging scales, fruit pickers).			2,740

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EXTENSION EQUIPMENT

2.

	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>COST</u>
Camera/Recorder	1	2,700	2,700
SVHS Recorder/Player	1	6,500	6,500
Edit Controller	1	1,950	1,950
Color Monitor	1	950	950
SVHS Player	1	5,900	5,900
Computer	1	4,000	4,000
FAX Machine	1	7,000	7,000

VEHICLES

3.

Multipurpose 4-wheel vehicles	4	12,000	48,000
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Support to CARDI from sources other than A.I.D.

As a regional institution, CARDI derives its financial support from two basic sources, member states and external donors. These two kinds of funding are currently distinguished as core (member states) and project (donors). This distinction is in some respects artificial, since some project support is designed to be highly integral with overall institutional goals and some core support is restricted in the way it is to be used. The latter fact is not surprising since member states in some cases view the institute as the sole vehicle for the conduct of agricultural research and one that should naturally reflect national priorities. The formal consultative process between CARDI and each country's officials ensures that the resulting program is jointly determined and agreed to by both. In addition, the stationing of at least one CARDI staff member in each country helps to ensure communication between the institute and national agencies.

The development of an integrated program based on core and project funding is a major challenge for regional research institutions. The reorganization and retrenchment of CARDI during the past two years, along with the development and implementation of its strategic plans, constitute major strides in the institute's articulating and carrying out a decentralized, but highly integrated work program. The changes have been carried out with the full agreement of the member states, which have provided extraordinary contributions (above core) reaching almost EC\$9 million to make required changes. They are also making significant progress in the payment of arrears. External donors have signaled their support for these changes and each is viewing its project in the context of CARDI's overall program and strategy.

In 1988, CARDI has returned to its regular funding procedures, with approximately two-thirds of the program supported through members' contributions, and the remaining one-third coming from donor-supported projects (exclusive of CARDATS). The portion of the budget attributable to external donors is lower than it was in 1986 and 1987, primarily due to the winding up of several large projects. New support for similar activities is expected to be at least partially regained in 1989, when a number of new donor-supported activities are expected to come on stream. The resulting ratio of roughly 60% core to 40% project is projected to remain fairly stable in the next four years, with moderate proportional growth expected in both categories. Following is a more detailed discussion of CARDI's funding and its impact on the institute's program.

Member states

CARDI is distinctive among international agricultural research organizations in the high proportion of its budgetary support derived from the member states. In 1986/1987, regular core contributions by the member states were EC\$6,757,000, representing 56% of the institute's external program support. EC\$4.1 million was also provided as an extraordinary contribution to underwrite costs associated with institutional reorganization and retrenchment. In addition to demonstrating the interest and support of CARDI by the governments in the region, these contributions are critical to CARDI's institutional integrity. As "core" contributions, they provide for flexibility and continuity, each key aspects in effective conduct of agricultural research and development. As noted above, one of the main challenges facing CARDI is the development of a coherent and unified program based on both core contributions and project support.

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As has frequently been the case in regionally supported research institutions, the formula for assessed contributions has not been without problems. In addition to vagaries that can result during political and economic instability, specific difficulties resulting from dissatisfaction or lack of communication can affect the support received from member states. In the case of CARDI, the above factors have weakened the funding base of the institution in the past. However, CARDI's restructuring and decentralizing has included close consultation with member states and has led to renewed political and financial support. An interesting aspect of the new arrangements is agreement by the four More Developed Countries (MDCs: Jamaica, Trinidad, Barbados and Guyana) members to bear a portion of the costs associated with CARDI core programs in and for the eight LDCs. They will do this through direct transfer of resources as well as through CARDI MDC programs' being regional in nature. This extension of regional cooperation to actual finance of research and development projects is unusual and should not go without notice by CARDI's other donors.

The Governing Body of CARDI approved a core budget of EC\$6.5 million for 1988/89 at its May 1987 meeting in Belize. The member states agreed to contribute this amount (in equivalent local currencies) according to the following formula: Jamaica and Trinidad and Tobago, 29% each; Barbados, 15%; Guyana, 12%; Antigua, Belize, Dominica, St. Kitts/Nevis, St. Lucia and St. Vincent, 2% each; Montserrat, under 1%. The Governing Council also agreed to a core expenditure budget of the same amount (EC\$6.5 million), but with proportionally more expenditure in LDCs than contribution source alone would warrant. The fungibility of funds is not entire, but in some cases, special efforts are being made to allow for currency conversion and transfer out of country (from MDCs) to support headquarters and OECS programs. Guyana, for example, has agreed to convert and transfer out EC\$20,000 per month of its Guyana dollar contribution, nearly one-third of the total. The approved contribution and expenditure levels for 1988/89 are given in Table 1.

Table 1. Contribution and allocation of approved 1988/89 core budget.

Country	Contribution (EC\$s)	percentage of total	expenditure (EC\$s)
Antigua	129,646	2	290,000
Barbados	960,508	15	650,000
Belize	130,589	2	164,000
Dominica	129,646	2	329,000
Grenada	129,646	2	185,000
Guyana	773,842	12	550,000
Jamaica	1,904,739	29	806,000
Montserrat	47,707	1	140,000
St. Kitts/Nevis	129,646	2	320,000
St. Lucia	129,646	2	341,000
St. Vincent	129,646	2	158,000
Trinidad & Tobago	1,904,739	29	545,000
Technical Services (HQ)			561,000
Headquarters (HQ)			1,461,000
TOTAL	EC\$6,500,000	100	EC\$6,500,000

Source: CARDI 1988/89 Detailed Work Programme and Budget

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Since the major restructuring of CARDI was undertaken in 1986, nearly all member countries have kept up with planned contribution levels. For 1988, all LDCs but one are basically current and among the MDCs, all are current on annual payments, and only one has fallen slightly (but not seriously) behind in its arrears payment schedule. One country (Guyana) is well ahead of schedule in its payments. For past years, particularly those before the restructuring of the institute, there are still significant balances outstanding. Estimated payments still owed the institute total EC\$2,393,712, but these figures are being revised downward as better information becomes available from CARDI branch offices. One problem of tracking contributions and expenditures has been the lack of a fully integrated accounting system, particularly in regard to some of the field offices where national contributions are received. CARDI has responded to this situation, and at present, strengthened administration and accounting divisions are putting an improved system in place. Results of an accounting of member states' contributions through CARDI's 1987/88 fiscal year (ends August 31, 1988) are now available and are presented in Table 2.

Table 2. Status of member states budget and retrenchment costs contributions as of August 31, 1988. (Unaudited.)

Country	balance retrenchment	(EC\$s)		1987/88 assessment	1987/88 payment	balance (8/31/88)
		owed (8/31/87) budget	total			
Antigua	82,165	58,828	140,993	129,646	152,997	117,642
Barbados	606,543	534,383	1,140,926	960,508	1,783,658	317,776
Belize	49,110	0	49,110	130,589	155,250	24,449
Dominica	82,165	359,376	441,541	129,646	353,314	217,873
Grenada	42,462	233,682	276,144	129,646	87,500	318,920
Guyana	480,284	277,972	758,256	773,842	1,654,697	(122,599)
Jamaica	518,721	2,608,491	3,127,212	1,904,739	1,694,918	3,337,033
Montserrat	30,150	42,551	72,701	47,707	35,206	85,202
St. Kitts/Nevis	82,165	308,193	390,358	129,646	90,000	430,004
St. Lucia	82,165	24,674	106,839	129,646	108,153	128,322
St. Vincent	82,165	130,446	212,611	129,646	217,414	124,843
Trin. & Toba.	1,203,876	1,654,339	2,858,215	1,904,739	3,265,237	1,497,717
TOTAL	3,341,971	6,232,935	9,574,906	6,500,000	9,598,344	6,476,562

Note: Amounts owed by some countries may be revised downward in coming weeks as contributions received near the end of the fiscal year are recorded.

As is indicated in Table 2, CARDI's arrears payments situation has improved overall by more than EC\$3 million during the 1987/88 fiscal year, most significantly in the cases of Barbados, Guyana, St. Vincent and Trinidad and Tobago. In five cases, the balance owed appears to have increased over the course of the year, but in only one case did the deterioration represent a significant worsening of the member states position. Some of the amounts owed are expected to be revised downward as a final accounting registers all member state contributions, so that the final reporting will appear even more favorable than the data above suggest. CARDI has indicated that it will be able to provide definitive statements in this respect by September 21, 1988.

The progress made on removing the arrears (both regular budget contributions and retrenchment costs) reflects an agreement for the repayment of outstanding balances approved by the Board of Governors on June 1, 1987. In some cases, arrears had accumulated from as far back as 1983. The agreement basically requires member states to pay 25% of the sum of their outstanding arrears and share of retrenchment costs before August 31, 1987, with the balance to be paid by equal monthly installment over 3 years. With more than EC\$3 million of a total of EC\$9 million owed having been paid in 1987/88, the group appears to be meeting the planned repayment schedule. Several countries unable to maintain their commitments under the agreement have arranged revised payment schedules with CARDI. The institute anticipates that all countries will eventually meet their commitments, and there are no plans for any portion of the contributions owed to be "written off".

A moderate rate of growth in member states' contributions is indicated in the CARDI 1988-93 Strategic Plan (June 1988), which was approved by the Governing Body at its 8th meeting on May 28, 1988. The figures projected (Table 3) reflect both program and management goals, including the standardization of a 60-40 division between salaries and operating costs (based on total budget). As it now stands, the member states have given a strong endorsement to CARDI and its new program. They have demonstrated support through provision of contributions (including large special assessments) and there is every indication that in the future they intend to continue and increase their commitments to the institute.

Table 3. Member state contributions (1985-88) and projected levels (1988-93) as approved by the CARDI Governing Council.

Year	Member state contribution 1/	Total CARDI budget 2/	percentage from members
	(EC\$000s)		
1985/86	7,621	12,857	58.4%
1986/87	6,757	11,996	56.4
1987/88	6,500	9,489	68.5
1988/89	7,378	11,515	64.0
1989/90	7,746	12,119	62.0
1990/91	8,134	13,009	62.6
1991/92	9,762	15,235	63.9
1992/93	10,249	16,000	64.0

1/ regular contributions only; does not include extraordinary payments.

2/ excluding CARDATS.

Members states' support of CARDI also affects the ability of the institute to attract the support of external donors. Project funding represents the other pillar upon which carrying out the CARDI program and achieving the goals in the Strategic Plan depends. Donor commitment is strengthened by a clear and concrete show of support for the institute by the member states. Since CARDI's full program includes donor projects as well as core funded activities, some of the expectations of member states could depend on receipt of anticipated support from other donors. Both kinds of support reflect confidence and commitment to the institute, and as such, they reinforce each other.

International Donors

A substantial portion of CARDI's total budget and program is associated with specific projects funded or assisted by the donor agencies of individual countries, regional organizations and United Nations agencies. The amount of project support has varied over time. Several years ago, when member states' contributions had fallen seriously behind, CARDI was very dependent upon two of its donors, EDF and A.I.D. Since that time, with the retrenchment of CARDI and the resumption of member payments, donor support has stabilized at about 40% of total funding (exclusive of CARDATS). Over the past two years, CARDI has launched a major effort to attract other donors, and this appears to be meeting with some success (see discussion that follows). Total support from external donors in recent years and projections for the next four years are listed in Table 4. Project Support from external donors is expected to stabilize at approximately 36-38% of the total budget (excluding CARDATS).

Table 4. Actual and projected levels of external donor support to CARDI, 1985-1993.

<u>Year</u>	<u>Donor contribution</u> ^(EC\$000s) <u>1/</u>	<u>Percentage of budget</u>
1985/86	5,238	42%
1986/87	5,239	44
1987/88	2,989 <u>2/</u>	32
1988/89	4,137	36
1989/90	4,643	38
1990/91	4,875	37
1991/92	5,473	36
1992/93	5,751	36

1/ actual (1985-88) or projected (1988-93); exclusive of CARDATS.

2/ large decline in project funding in 1988 due to wind-up phases of both FSRD and EDF Lome II projects.

CARDI has the important task of developing an integrated program based on its core and project support; this argues for a judicious approach to project support on the part of CARDI and a clear understanding of this institutional requirement on the part of its donors. Fortunately, most donors acknowledge the larger benefits derived from support that is integral to CARDI's task as well as to the accomplishment of their own objectives. This realization is reflected in the establishment of an informal donor support group meeting in conjunction with the twice-yearly CGIAR meetings, as well as the more frequent consultation among donors within the Caribbean and in the OECS in particular. In addition, CARDI's programs in many cases complement other bilateral and regional agricultural projects sponsored by the same or different donors. In some cases, this complementarity between different "pockets" is actively sought by the donor; in others, it may be left to the initiative of individuals involved at the operational level.

CARDI's donors in recent years have included the European Development Fund (EDF) of the European Community (EEC), the Canadian International Development Agency (CIDA), the International Development Research Centre (IDRC-Canada), the Food and Agriculture Organization of the United Nations, Barclays Bank Development Fund and A.I.D. With the integration of CARDATS into CARDI, UNDP

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joins the ranks of significant contributors. Another likely addition in the near future is the British Development Division (BDD). Other donors currently considering support of CARDI include IFAD, Italy, the Inter-American Development Bank (IDB) and the Agricultural Gulf Fund for the United Nations (AGFUN). Following are brief assessments of current positions and future plans for donors to CARDI other than A.I.D.

EDF -Under the Lome II Agreement, EDF has supported three areas of CARDI's program: pasture agronomy (primarily devoted toward alkaline soils), soil and water conservation, and arid cultivation. The first effort has involved the provision of a forage expert located in Antigua. Support to CARDI under Lome III over the next five years is currently being considered, with the likelihood of continued involvement being nearly assured. Although specific program areas and funding levels are yet to be decided, support could be quite substantial (probably reaching several hundred thousand US\$ per year).

EDF's decision is being based in part on a February 1988 report on their assistance to CARDI under Lome II. One likely change in the new project would be the shift of the forage researcher out of the OECS to an MDC location (Guyana or Jamaica) in order to assist CARDI in the development of pastures technology for acid soils. This move reflects the progress made in the alkaline soils pasture effort, as well as the training of local researchers to continue that activity. EDF is making a strong consideration of CARDI's institutional needs and will design its future program with strengthening of CARDI, as well as achieving program objectives, in mind. EDF also supports bilateral agricultural programs in OECS countries, and sees its contribution to CARDI as an integral component of its regional agricultural development portfolio.

BDD -The British Development Division conducts a number of agricultural development projects in the OECS countries. Major themes for BDD include tree crops, coffee, fruit and spices, with diversification being a major goal. Like EDF, its portfolio features numerous bilateral activities and some regional efforts, mostly through the provision of resident technical experts with regional agencies. CARDI has received two staff through the BDD regional technical assistance project--one a tissue culture researcher recently arrived in Barbados, and one a biometrician based with CARDI in Jamaica but available for consultation in the OECS countries. BDD also funds a pathologist at WINBAN who is available for consultation on disease problems in other crops as well.

BDD is currently exploring an expansion of its support to CARDI through a second regional project on tree crop research based in Dominica with outreach throughout the Windwards. Two expatriate experts would be provided, an entomologist and a plant physiologist, the latter working primarily on post-harvest problems. CARDI will contribute 50% towards a plant pathologist. The activity is planned for five years at a total budget of US\$1,113,500. The activity would clearly strengthen CARDI's efforts in tree and fruit crops, and would be consistent with the diversification objectives established in the CARDI strategic plan. It will emphasize pest control, agronomy, varietal evaluation and training on mango, grapefruit, avocado, passionfruit and soursop. A small building will be constructed (prefab) that can later be disassembled and

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moved if needed. The training portion of the project includes three graduate assistantships at UWI. BDD's interest in developing a regional project with CARDI in part reflects the donor's assessment that research priority setting and implementation have been considerably strengthened in CARDI's reorganization.

FAO -FAO support of CARDI is different from that of other project donors. Its support is more in the area of technical cooperation and technical assistance than in conducting projects. An on-going area of support is in pigeon pea selection, where CARDI participates as a regional entity in a global program. At present, FAO is assisting CARDI in the development of its tissue culture research capacity in Barbados with a contribution of EC\$150,000. FAO is also working to integrate CARDI into its global agricultural information network, which will strengthen CARDI's information access capability, as well as offer it the opportunity to more actively contribute technical information to global data bases used by FAO and many other organizations. FAO activities in the region such as pre-investment studies for development banks, plant protection services, etc., may also indirectly involve and benefit CARDI.

FAO plays an instrumental role in bringing CARDI and potential donors together. In addition to convening and chairing the recent meetings of the CARDI donor group at CGIAR meetings (Chairman, Dr. Mohammed Zehni), it has assisted CARDI in its approach to the Government of Italy and AGFUN (see separate sections below). Such efforts are conducted under the aegis of the FAO/Governments Cooperative Programme.

CIDA -CIDA has assisted CARDI through a series of small to medium-sized grants in diverse subject areas administered by the Canadian High Commission in Barbados. Current projects include dairy settlements (1985-88, EC\$181,000), integrated pest management (1987-88, EC\$78,000, and topworking (grafting) mangoes (1987-89, EC\$95,000). CARDI and CIDA are now exploring the possibility of developing a large-scale project on sheep and goat development. The proposed activity would probably be based in Jamaica and Tobago, but is intended to develop technologies for adaptation across the region. The main thrusts would be to use Barbados black-belly hair sheep to upgrade livestock across the region, leading to eventual self-sufficiency in mutton. CIDA is quite interested in the proposal, which is under consideration in the Caribbean regional program office in Canada. They plan to send a feasibility study to the region to work with CARDI on developing the proposal further in the near future. The chances of a fairly major activity developing with CARDI (roughly US\$2 million over five years) appear good, although it may not be limited to the CARDI sheep-goat proposal as it now stands. CIDA did sponsor a large study on agricultural diversification in the OECS and could possibly want to consider some of the opportunities reviewed in their study.

CIDA is currently undergoing major decentralization, and the Barbados office will be adding numerous technical staff. Authority of up to Can.\$5 million will be granted to the regional office. William Anderson will be joining the mission in late September and will have responsibility for CARDI activities. Canada is quite keen to develop closer donor consultation regarding CARDI and agricultural

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activities in general. In their view, the type of consultation that exists on water issues (led by PAHO), is very useful.

- IDRC -IDRC has provided support to CARDI in two areas. It has assisted the institute develop its farming systems information services (1987-89, EC\$476,000), an area where the donor has special expertise and worldwide involvement. Its larger support though, has been in the development of milk production systems in Guyana. Phase I of the project ran from 1985-1988 at a total contribution of EC\$918,000. Phase II, planned to run from 1989-1991 with IDRC funding of EC\$248,000, is now in the final stages of approval.
- Italy -Italy has not been a donor in the past, but is now considering a large-scale seed production project to assist CARDI and the Caribbean states. The project is integral to CARDI's strategy, and is designed to 1) screen and multiply seed of improved varieties of forages, legumes and other crops; 2) establish internal quality control for seed multiplication of vegetatively propagated materials of yam, tannia and ornamentals; 3) improve seed testing services; and 4) develop better policy, extension and general awareness contributing to expanded use of better planting material. The project would be based in Antigua, which is already a focus for CARDI seed production efforts (pigeon pea, forages) and has an ideal climate for the activity. The requested funding level is US\$2.48 million over three years. The project is now under consideration, and although no time for a final decision has been set, one is expected by early 1989. A copy of the proposal is available in RDO/C.
- AGFUN -AGFUN is a special fund set up by the Arabian Gulf states to assist the United Nations in agricultural development efforts. The fund is designed to complement existing activities; in the past, it has assisted CARDATS and an FAO project on intra-regional trade in the Caribbean. The fund has indicated a new interest in the region, and the head of AGFUN will visit the region in September. Areas of potential involvement include post-harvest handling and storage and dock facilities, but might also include direct support to some areas of CARDI's work. FAO will assist the institute in exploring possible support from this donor.
- IDB -IDB has not been a donor to CARDI in the past, but has now indicated that it may support a project designed to strengthen agricultural research networking activities in the Caribbean. IICA is assisting CARDI in identifying a consultant to assist in developing a proposal based on its strategy to develop commodity-based research networks. The activity is expected to be designed at roughly US\$3.5 million over the four-year period 1989-1992. There is some question here as to what IICA's role would be, if any; questions of turf may arise and IICA could view CARDI as competing with its programs and presence particularly at the national and OECS level. IICA sees its role as one of supporting national programs; it may not see itself as needing to support CARDI. The development and channeling of IDB support to agricultural networking in the Caribbean should be closely followed by CARDI's donors.

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IFAD -IFAD is currently considering two proposals from CARDI. The highest priority in CARDI's view is one designed to improve sheep and goat production systems. It would be focused on farms in the OECS region, but especially in Antigua and St. Kitts, where livestock are especially important. It would provide one livestock scientist and one economist to the institute, with total funding of US\$2.1 million over four years (1989-1992). The proposal was submitted in June, 1988 after having had the assistance of Gustavo Norres (former Deputy Director, CIAT) as a consultant on its development. CARDI expects to be advised of IFAD's decision by the end of 1988. The project would link with the breed improvement work of CARDI, which will be expanded under the CIDA project if it is implemented.

A second project submitted to IFAD would assist CARDI's on-farm testing and validation of root crop technologies. It would supplement existing programs in the OECS, and would not provide full-time scientific positions. The project has been submitted with a total budget of US\$500,000 to cover the period 1989-1992 (four years). This project is of lesser priority than the livestock activity listed above. The time table on donor decision is the same.

BBDF Barclays Bank Development Fund has provided assistance to CARDI to develop its integrated pest management capacity. From 1984-1987, it contributed EC\$615,000. A new seed production project is now being considered, which would focus on production and quality control in peanut, pigeon pea, pepper, tannia and yam. As with most CARDI seed production activities, it will be based in Antigua. A seed technologist will be provided to CARDI under the project.

UNDP -UNDP has in a sense become a donor to CARDI by accident. As the main (really sole) donor to CARDATS, it became a CARDI donor when CARDATS was merged into CARDI. Some portions of CARDATS, particularly managerial ones, have been integrated into the institute's overall structure. Operations are also proceeding smoothly. Funding and finance remains essentially separate, however, and CARDATS is separately identified as an element within the projected CARDI budget until 1991. CARDATS' budget is substantial, with expected expenditure to be EC\$3.8 million in 1988/89. Expenditure is throughout the OECS region, at approximately EC\$500,000 per country. Projected budgets over the next two years is expected to be less: 1989/90, EC\$1.66 million; 1990/91, 1.78 million.

The principle question now facing CARDI and its donors (assuming program and managerial issues have been effectively handled) is what will become of the activity once a large portion of separately identified funding is no longer available (after August, 1991). It is clear that UNDP no longer wishes to fund the project after its current commitment expires. Their hope is that some or all of the critical CARDATS program will be shouldered by CARDI, under the assumption that considerably more core funding might then be available. The cost of CARDATS as now constituted makes that possibility unlikely. On the positive side, the new relationship between UNDP and CARDI may lead to the development of new activities between the two organizations. UNDP does anticipate the continuation of some agricultural development portfolio in the future, and CARDI would seem to be a likely candidate. It is worth noting here

CONDITIONS AND COVENANTS

The following are the Conditions Precedent and Covenants of the project as specified in the Project Grant Agreement.

Conditions Precedent to First Disbursement. Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.:

(a) An opinion of counsel acceptable to A.I.D. that this Agreement has been duly authorized and/or ratified by, and executed on behalf of, the Grantee, and that it constitutes a valid and legally binding obligation of the Grantee in accordance with all of its terms;

(b) A statement of the name of the person holding or acting in the office of the Grantee specified in Section 8.2., and of any additional representatives, together with a specimen signature of each person specified in such statement;

(c) Evidence that a Project Manager, acceptable to USAID and UWI, has been designated with appropriate delegations of authority to effectively manage the implementation of the Project;

(d) The names, qualifications and job descriptions for all professional personnel funded under the Project.

(e) A Project Sub-agreement, between CARDI and the University of the West Indies (UWI), as described in Annex I, for the purpose of defining the functions and budget allocations under the Grant for each institution.

(f) Evidence that the Project has the support of OECS Governments.

Conditions Precedent to Disbursement for Expenses other than Personnel and Financial Management Staff.

Prior to disbursement under the Grant for activities other than personnel and financial management staff or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.

(a) Evidence of the establishment of a Project Management Committee, comprised of CARDI's Executive Director (or nominee), the Dean of the Faculty of Agriculture of UWI (or nominee), the Deputy Executive Director (Development) at CARDI; the Head of the Department of Agricultural Extension, UWI and the Project Manager.

(b) Evidence of the establishment and organization of a Project Country Team within each participating OECS country, to be comprised of the CARDI country representative or designee, the UWI extension specialist, and the chief extension officer or designee, of the Ministry of Agriculture, with the head of the Team being the CARDI representative in each respective country who will have project organizational and reporting responsibilities directly to the Project Manager.

(c) Evidence that the CARDATS program has been fully integrated into the organizational structure and operation of CARDI.

(d) A first year workplan for each component of the Project. The workplan should contain a detailed implementation plan, staffing arrangements, specifications for equipment, operating and research expenses, and budget, including CARDI, UWI and OECS host government contributions. The plan will show the rational allocation of Project resources among the Participating OECS countries.

(e) Evidence that CARDI is receiving, on a timely basis, adequate core funding from member countries.

(f) Evidence that CARDI is actively seeking other donor support for activities relating to accomplishment of the objectives of this Project.

Conditions Precedent to Disbursement for Construction
/Renovation Activities

Prior to disbursement under the Grant for activities involving the construction/renovation of project research and extension facilities, or to the issuance by AID of documentation pursuant to which disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish to AID in form and substance satisfactory to AID.

(a) Evidence that CARDI has thoroughly assessed the potential environmental impact of any construction activities planned under the project, and that AID has approved these activities in accordance with U.S. environmental rules and regulations.

(b) Evidence that the OECS countries or CARDI obtained title to the land on which construction will be financed with Project funds.

Covenants

Project Evaluation. The Parties agree to establish an evaluation program as part of the Project. Except as the Parties may otherwise agree in writing, the program will include, during the implementation of the Project and at one or more points thereafter:

(a) evaluation of progress toward attainment of the objectives of the Project;

(b) identification and evaluation of problem areas or constraints which may inhibit such attainment;

(c) assessment of how such information may be used to help overcome such problems; and

(d) evaluation, to the degree feasible, of the overall development impact of the Project.

Pesticides. It is anticipated that certain limited amounts of pesticides will be purchased under this Project for laboratory and field plot use. The Grantee covenants that prior to initiation of the procurement of any

pesticide to be financed under the Project, the Grantee will inform A.I.D. in writing of the proposed procurement and use of the pesticide, including a detailed description of how the pesticide will be used and the safeguards to be followed, and shall obtain the written approval of A.I.D. prior to initiation of procurement procedures of the pesticides.

Agricultural Activities. The Grantee covenants that in carrying out Project activities under this Agreement, the Grantee shall avoid (1) projects or activities which would cause or threaten substantial injury to the production, marketing, or pricing of United States agricultural commodities or products for export and (2) projects or activities involving production, processing or marketing of sugar, palm oil or citrus for export.

Adequate Staffing. The Grantee covenants that it will provide adequate staff to work with all technical specialists under the Project.

Grantee Contribution. The Grantee covenants (a) to make available, on a timely basis, its local currency contribution as specified in Annex I to this Agreement and, (b) to seek and continue to receive adequate core funding.

Per Diem. The Grantee covenants that per diem expenses to be reimbursed or paid under the Grant shall not exceed those which AID pays to its employees pursuant to its established regulations.

Integration of Research and Extension. CARDI covenants to make best efforts to undertake the functional integration of research and extension activities on a country by country basis by the end of the Project.

Women as Target Group. CARDI covenants to place high priority on the incorporation of women as beneficiaries in the integrated research and extension activities of the Project.

Annual Work Plans. Subsequent to the first year of the Project, the Grantee covenants to submit to AID in form or substance satisfactory to AID, yearly work plans detailing activities to be undertaken for the subsequent twelve month period.

DETAILED BUDGET TABLES

	Technical Staff (1)					Total
	(\$000)					
	89/90	90/91	91/92	92/93	93/94	
Extension						
Ext Spec Windwards	-	-	-	-	-	-
Ext Spec Leewards (2)	33.0	34.5	36.0	-	-	103.5
Comm Coord (2)	26.5	27.7	29.0	-	-	83.2
Farm Mngt Spec (2)	33.0	34.5	-	-	-	67.5
Admin Officer	18.0	18.9	19.8	20.8	21.9	99.5
Admin Assistants	12.0	12.6	13.2	13.9	14.6	66.3
Total	122.5	128.2	98.1	34.7	36.5	420.0
Research						
Tech Adapt Spec (3)	144.0	151.2	158.8	111.2	87.6	652.8
Agr Econ	25.2	26.5	27.8	29.1	-	108.6
Pomologist	25.2	26.5	27.8	29.1	-	108.7
Admin Officers	25.2	26.5	27.8	29.2	30.6	139.2
Admin Assistant	12.0	12.6	13.2	13.9	14.6	66.3
Admin Assistant (4)	43.2	45.4	47.6	50.0	52.5	238.7
Total	274.8	288.6	303.0	262.6	185.3	1314.3
Total	397.3	416.8	401.1	297.4	221.8	1734.3

- Notes: 1 Assumes 5% annual increase.
 2 Arbitrary amounts (\$3.0 each year for Ext Spec Leewards, Farm Mngt Spec, and \$2.5 added to arrive at total; needed corrected salaries.
 3 Assumes funding for 6 position for first 3 years; 4 positions fourth year, and 3 positions fifth year; starting salary is \$24.0.
 4 Starting salary is \$7.2.

Research/Training Centers (1)						
(\$000)						
	89/90	90/91	91/92	92/93	93/94	Total
St. Lucia (2) (fruits, roots, yams)	-	75.0	75.0	-	-	150.0
Antigua (3) (Vegetables)	50.0	-	-	-	-	50.0
St. Vincent (4) (root crops)	-	25.0	25.0	-	-	50.0
Total	50.0	100.0	100.0	0.0	0.0	250.0

Notes: 1 Assumes Dominica laboratory -- fruits, tissue culture -- will be supported by BDD.

2 Training/demonstration room, greenhouse, tissue culture facilities, propagation bins, storage, office upgrading, field laboratory (post/harvest-packing, storage/chill room), initial farm development - fencing, drainage, infrastructure (roads)

3 Upgrade office to include CAEP, demonstration room

4 Initial farm development (fencing), drainage, field laboratory, tissue culture facilities, office, training/demonstration room

	Equipment and Supplies (\$000)					Total
	89/90	90/91	91/92	92/93	93/94	
Extension						
Supplies (1)	19.0	31.0	31.0	31.0	31.0	143.0
Vehicle	12.0					12.0
Equipment (2)	22.0	-	-	-	-	22.0
Research						
On-station equipment and supplies (3)	30.0	30.0	10.0	10.0	5.0	85.0
Office supplies/equip						
Extension/Fax Machine	11.5	10.0	10.0	10.0	10.0	51.5
Research	10.0	10.0	10.0	10.0	10.0	50.0
Vehicles (4)	50.0	-	-	-	-	50.0
Total	154.5	81.0	61.0	61.0	56.0	413.5

Notes: 1 Film, video cassettes, paper, publication materials/supplies
for fact sheets and bulletins.

2 Video camera, computer equipment

3 To be supplied

4 Three vehicles, one each for St. Lucia, Antigua, and St. Vincent.

CARDI	90.0	40.0	20.0	20.0	15.0	185.0
UWI	64.5	41.0	41.0	41.0	41.0	228.5
Total	154.5	81.0	61.0	61.0	56.0	413.5

**Research and Extension Expenses
(\$000)**

	89/90	90/91	91/92	92/93	93/94	Total
Farm Management	5.0	5.0	5.0	5.0	5.0	25.0
Station Experiments (1)	51.0	53.6	56.2	59.0	62.0	281.8
On-farm Validation (2)	10.5	10.5	10.5	10.5	10.5	52.5
Total	66.5	69.1	71.7	74.5	77.5	359.3

Notes: 1 Staff expenses, 2 recorders @ \$4.5 and 4 laborers @ \$2.0 at each of three stations = \$17.0 x 3 = \$51.0; staff expenses assume 5 percent annual increase.

2 15 farmer sites x 7 countries x \$100 each site for seeds, fertilizer, labor, signs.

CARDI	61.5	64.1	66.7	69.5	72.5	334.3
UWI	5.0	5.0	5.0	5.0	5.0	25.0
Total	66.5	69.1	71.7	74.5	77.5	359.3

**Staff Travel
(\$000)**

	89/90	90/91	91/92	92/93	93/94	Total
Local Travel (1)	13.5	13.5	13.5	13.5	13.5	67.5
Regional Travel (2)						
Ext Spec Windwards (3)	20.0	20.0	20.0	20.0	20.0	100.0
Ext Spec Leewards (3)	20.0	20.0	20.0	20.0	20.0	100.0
Farm Mgt Spec (4)	7.5	7.5	-	-	-	15.0
Commun Spec (5)	4.5	4.5	4.5	-	-	13.5
Exten Coord (6)	11.0	11.0	11.0	11.0	11.0	55.0
Total	63.0	63.0	55.5	51.0	51.0	283.5
Tech Adapt Coord (3)	20.0	20.0	20.0	20.0	20.0	100.0
Agr Econ (7)	7.5	7.5	7.5	7.5	7.5	37.5
Pomologist (7)	7.5	7.5	7.5	7.5	7.5	37.5
Total	35.0	35.0	35.0	35.0	35.0	175.0
Project Manager (8)	5.0	5.0	5.0	5.0	5.0	25.0
ExtraRegional Travel (9)	6.0	6.0	6.0	6.0	6.0	30.0
TOTAL	122.5	122.5	115.0	110.5	110.5	581.0

Notes: 1 2 countries x 60mi/trip x 200 days x \$0.30/mi x 5 yrs = \$36.0
 2 countries x 30mi/trip x 200 days x \$0.30/mi x 5 yrs = \$18.0.
 3 countries x 15mi/trip x 200 days x \$0.30/mi x 5 yrs = \$13.5.
 2 Per diem assumed \$100/day; Average airfare assumed \$250.
 3 Assume 15 days/mo, 11 mo/yr, with 11 trips/yr (\$19.25).
 4 Assume 10 days/mo, 6 mo/yr, with 6 trips/yr (\$7.5).
 5 Assume 5 days/mo, 6 mo/yr, with 6 trips/yr (\$4.5).
 6 Assume 7.5 days/mo, 11 months/yr, with 11 trips/yr (\$11.0).
 7 Assume 10 days/mo, 6 mo/yr, with 6 trips/yr (\$7.5).
 8 Assume 6 days/mo, 6 mo/yr, with 6 trips/yr (\$4.1).
 9 Assume air fare = \$750, per diem = \$750 (to IARCs, etc).

CARDI	56.5	56.5	56.5	56.5	56.5	282.5
UWI	66.0	66.0	58.5	54.0	54.0	298.5
Total	122.5	122.5	115.0	110.5	110.5	581.0

	Training/Meetings (\$000)					Total
	89/90	90/91	91/92	92/93	93/94	
UWI Exten Dip Course (1)	-	60.0	-	60.0	-	120.0
MSc, IARCs (2)	45.0	75.0	45.0	15.0	-	180.0
Workshops, Meetings In-Country (3)	8.4	8.4	8.4	8.4	8.4	42.0
Multi-Country						
Networks (4)	18.0	18.0	18.0	18.0	18.0	90.0
Res/Ext Annl Meet (5)	16.2	16.2	16.2	16.2	16.2	81.0
In-Serv Reg Exten (6)	15.0	15.0	15.0	15.0	15.0	75.0
Spec Topics Exten (7)	9.0	-	9.0	4.5	-	22.5
Mgt Training (8)	10.0	10.0	10.0	10.0	10.0	50.0
RAECC (9)	18.0	-	18.0	-	18.0	54.0
Short-term (10)	6.4	6.4	6.4	6.4	6.4	32.0
Total	92.6	65.6	92.6	70.1	83.6	404.5
TOTAL	146.0	209.0	146.0	153.5	92.0	746.5

- Notes: 1 5 OECS extension staff each in 2 sessions @\$12.0.
2 Equivalent to 6 MSc degrees, 2 yrs each at \$15.0/yr, but could be used for one-yr MSc such as UWI Crop Protec MSc or year in IARC or US univ (in comb w/UWI degree): 2 CARDI, 4 UWI.
3 Front-line extension train: 10 staff x 3 days/ses x \$20 day = \$600 per ses x 2 times/yr x 7 countries = \$8.4.
4 Root Crops: 10 persons x \$400/per = \$4.0 x 5 years.
Fruits: 10 persons x \$400/per = \$4.0 x 5 years.
Farming Systems: 15 persons x \$400/per = \$6.0 x 5 years.
5 18 persons x \$900/per = \$16.2 x 5 years. (CARDI: 7 TA Spec, Pomol, Agr Econ, Proj Coord, Exec Dir == 12) (UWI: Comm Spec, Farm Mgt Spec, 2 Reg Exten Spec, Proj Coord, Dean = 6); Budget CARDI 2/3; UWI 1/3.
6 Leewards: 10 persons x \$600/per = \$6.0 x 5 years.
Windwards: 15 persons x \$600/per = \$9.5 x 5 years.
7 20 persons x 3 days x \$100/day; 20 per x \$150 travel = \$9.0; but perhaps, in part merged with In-Serv Train or held less frequently, e.g., only for contingency (so calculation halved)
8 20 persons x 3 days x \$100/day; 20 x \$200 travel = \$10.0 (12 CARDI Reps, 4 Prog Leaders, 4 others such as ED, DEDs, Exten Coord).
9 15 persons x \$600/per = \$9.0 each for Windwards & Leewards or combine Windwards/Leewards for 30 persons = \$18.0; 3 times.
10 To IARCs (1/2 CARDI, 1/2 UWI)

CARDI	57.0	67.0	57.0	47.0	42.0	270.0
UWI	89.0	142.0	89.0	106.5	50.0	476.5
Total	146.0	209.0	146.0	153.5	92.0	746.5

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Technical Collaboration (1)
(\$000)

	89/90	90/91	91/92	92/93	93/94	Total
U.S. (2,3)						
Extension (4)	22.5	23.6	24.8	26.0	27.3	124.3
Research (5)	39.5	41.5	43.5	45.7	48.0	218.3
UWI (6)	19.5	20.5	21.5	22.6	23.7	107.7
TOTAL	81.5	85.6	89.9	94.3	99.1	450.3

Notes: 1 Assumes 5 percent annual increase.

2 Assumes U.S. technical collaboration will be primarily to continue linkages with MUCIA and SECID institutions.

3 Assumes daily rate of \$500 (\$270 salary, \$110 per diem, \$120 overhead)

4 37 days/year for 5 years.

3(10 days each) x \$500/day = \$15.0
 1(7 days each) x \$500/day = 3.5
 4 air trips @ \$1.0 = 4.0
 Total \$22.5

5 65 days/year for 5 years.

Management

2(7 and 8 days each) x \$500/day = \$7.5
 2 air trips @ \$1.0 = 2.0
 Total \$9.5

Technical (Networks, etc.)

5(10 days each) x \$500/day = \$25.0
 5 air trips @ \$1.0 = 5.0
 Total \$30.0

6 65 days/year primarily for extension/farm management training but also on research (45 days UWI, 20 days CARDI).

13 (5 days each) x \$250/day = \$16.25
 13 air trips @\$250 = 3.25
 Total \$19.5

CARDI	45.5	47.9	50.2	52.7	55.3	251.6
UWI	36.0	37.7	39.6	41.6	43.8	198.7
Total	81.5	85.6	89.8	94.3	99.1	450.3

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