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THE FRUIT SUB-SECTOR IN THE WINDWARD ISLANDS

Diagnosis-Strategy-Actions

Jerry La Gra
Rafael Marte

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PREFACE

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IICA - CIDA

During the Second Regular Meeting of the Inter-American Board of Agriculture held in Jamaica, October 24-28, 1983, the Minister of Agriculture from St. Vincent and the Grenadines, on behalf of the Ministers of Agriculture of the Windward Islands, made representation to the Director General of IICA regarding the need for a combined Windward Islands effort in the production/marketing of agricultural commodities other than banana.

Recognising the urgency of the situation, the governments of the Windward Islands subsequently took a number of initiatives including a request to the Caribbean Development Bank (CDB) for assistance.

The CDB and IICA negotiated and signed an Agreement on January 13, 1986 for carrying out a Joint Production/Marketing Study in the Windward Islands

The objectives of this joint venture were the following:

- To carry out a practical study on production and marketing of selected agricultural commodities to determine key current production and marketing constraints and alternative solutions.
- To identify and prepare specific project profiles to deal with the exporting of specified produce from the four Windward Islands of the Caribbean to extra-regional markets, as determined feasible.

Desired outputs of the Study were to include the identification of key problem areas in production and marketing, project profiles, and recommendations for training programmes.

The results contained herein go beyond the terms of reference of the above mentioned agreement. This was done purposely so as to create as comprehensive as possible, an information base, under the belief that the more and better organised the information, the better the quality of the decisions made. Hopefully, others will contribute to and build upon this documentation in the future.

The Project ideas presented in profile form are complementary to other ongoing activities within the Sub-region. Taken together the actions should be sufficient to overcome most of the constraints to the development of the fruit sub-sector. The important thing to recognize is that the problem is extremely complex and a large number of actions will have to be carried out simultaneously, and as part of a well orchestrated programme, if favorable results are to be expected.

It is our hope that this effort will serve as the catalyst for the organised development of the fruit sub-sector in the Windward Islands. Such an undertaking will require an even greater team effort and close co-ordination between the governments of the Sub-region and the diverse national, regional and inter-national organisations.

Reginald Pierre
IICA Caribbean Director of Operations

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The planning, collection, analysis, typing and publication of the information contained in this document was a joint effort, made possible through co-operation and support of multidisciplinary teams in each country. However, the authors alone accept responsibility for any errors in the interpretation of data or mistakes in presentation. It is hoped that such errors can be identified and corrected over time.

The authors wish to thank Reginald Pierre, IICA's Regional Director for the Caribbean, and Bernard Yankey, Director of CDB's Projects Department, who provided valuable orientation and supervision throughout the study. John Elwin of the Caribbean Development Bank assisted in writing the introductory chapter and provided useful suggestions in the design of the study methodology.

The foundation of the document was built by national technicians in each of the four islands. In all cases they proved their capacity to collect, organize and present in report form, baseline information so necessary for decision making. These specialists made this comprehensive report possible. Their names, by country, follow:

Dominica: Claudia Bellot, Colin Bully, Hannah Clarendon, Kerwin Ferreira, Neville Graham, Felix Gregorie, Oliver Grell, Charles James, Cecil Joseph, Milton Lawrence, John McIntyre, Anthony Sorhaindo, Johnathan St. Jean, Clemencia Victor, Jennifer White and John Winter.

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St. Vincent: Glenroy Brown, Emmett Doyle, Sylvester Lynch, Erica McIntosh, Hugh Phillips and Samuel Scott.

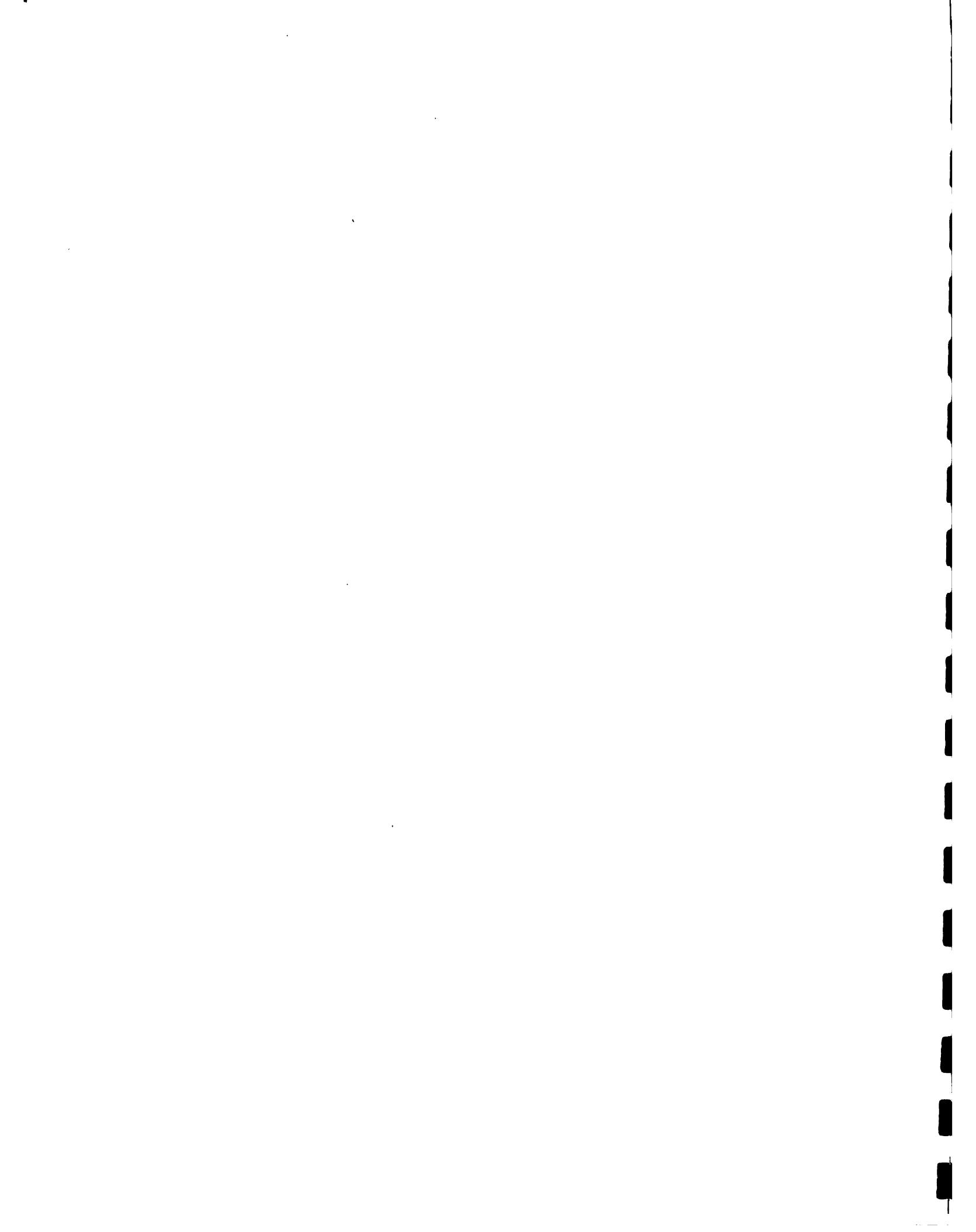
Oliver Grell in Dominica and Hugh Phillips in St. Vincent played an important additional role, functioning as technical co-ordinators in their respective countries, in addition to being consultants on specific topics.

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Fruit Production Specialist

Jerry La Gra
Marketing Specialist



EXECUTIVE SUMMARY

A common felt need to increase non-traditional fruit tree crop production prompted the Ministers of Agriculture from the Windward Islands to request IICA and CDB assistance in analyzing the potential for joint marketing of selected fruits. This led to an agreement between IICA and CDB in January 1986 to carry out a joint effort to determine priority constraints to the production/marketing of selected fruits and to identify and prepare project profiles, as part of a Sub-regional strategy, to overcome these constraints.

The conceptual framework of the study was based on the fact that successful marketing necessitates being able to supply continuous quantities of quality produce at competitive prices, assuring that the commodity is available at the proper place and at the proper time. The identification of the constraints preventing these conditions from being met in the Windward Islands was undertaken using a comprehensive commodity systems methodology developed specifically for this study. The analysis covered the following four broad areas: macro-environment and institutional structure; pre-production, production and harvest; postharvest handling, and marketing.

The diagnosis was carried out by inter-disciplinary teams of national technicians coordinated and supervised by IICA production and marketing specialists. The results of the diagnosis are presented by country and by commodity, in addition to a regional overview of the four areas mentioned above. A brief analysis was carried out on the two principal regional experiences in marketing, namely CATCO and WINBAN. A summary of the lessons learned from these two experiences is included. Appendices to the diagnosis include summary conclusions, trade statistics and baseline information on farmers organizations, all on a country basis.

The study collected and organized on a comparative basis, island by island, a great deal of information. While much of it is relevant to the whole agricultural sector, data collected on crops concentrated on mangoes, avocados, grapefruit, oranges, limes, breadfruit and plantain. These fruits were selected because they are common to all four islands and are produced in relatively large quantities. Crops such as soursop, sugarapple, goldenapple, guava, passion fruit, papaya and a few others, are produced in relatively large amounts in some of the islands, however, in general they tend to be more scattered, less standardized and highly perishable, thus less conducive to a joint marketing effort.

All four islands were found to have favourable ecological conditions for a wide variety of tropical fruits.

~~Regarding quantity of production, it is recognized that very little reliable~~
production data exists. Most production statistics are based on estimates and projections, often made by expatriates on short-term missions. The situation is complicated further by the existence of a wide variety of cultivars or fruit types with very distinct characteristics. Given this lack of reliable production data, the best sources of information are the national specialists working with fruit production and national trade statistics.

Of the seven fruits studied, ~~oranges~~, ~~mangoes~~, grapefruit, breadfruit and plantains are considered to be produced in large enough quantities to warrant consideration for organized joint marketing. Oranges and limes are not included since only Dominica produces volumes on an exportable scale. In the case of oranges, the Sub-region has not been able to compete on the world market, neither in quality or price. In the case of limes, European and North American demand tends to be for the Persian or Tahiti (seedless) lime whereas most production within the Sub-region is of the West Indian variety.

The international market for mangoes¹ is good and growing. Although there are enormous amounts of mangoes grown within the Sub-region, there are upwards of 40 different types. The majority of these do not have the characteristics preferred in the European and North American markets. Therefore, volumes of suitable cultivars for export represent a small percentage of the total mango crop. Although sufficient volumes of selected cultivars are available within each country to develop specialized, mainly ethnic, markets, sufficient volumes to justify joint marketing of mangoes to either European or North American markets are presently unavailable. Total exports of all types of mangoes from the four islands in 1985 amounted to 1,894 tonnes. Of these, only 522 tonnes went to extra-regional, mainly ethnic, markets.

The world market for avocados² is better developed than for most tropical fruits. It continues to grow but at a decreasing rate and competition is very keen. Avocados are produced in relative abundance throughout the Sub-region. Like mangoes most are produced from a wide range of West Indian type seedlings with very distinct flavours, size, oil content, ability to travel, among others. Because of this wide variation of characteristics and the highly competitive market, potential for extra-regional exports is severely limited. Total exports from the Sub-region in 1985 added up to 1,596 tonnes, of which only 2% went to extra-regional markets.

The world market for grapefruit³ has matured. Any significant increase in supply will likely cause a significant decline in price. There is very strong competition for fruit of high quality, large volumes and low prices. The principal supplier of grapefruit within the Sub-region is Dominica. Due to its inability to compete in price on the world market, most Dominican grapefruit is sold within the region. Whereas the growing demand is for Ruby red, most of the grapefruit produced within the Sub-region is Marsh white. Perhaps the best alternative for marketing grapefruit lies within the region and in domestic agro-processing. Total exports of grapefruit from the Sub-region in 1985 reached 2,500 tonnes. Some 95% of these came from Dominica and 23% of the total went to extra-regional markets, ~~during a six-week window in August-September.~~

~~Plantains~~ are consumed mainly by ethnic populations in Europe and North America but there is considerable crossover potential. In 1986 the USA imported 106,000 tonnes. The market for this commodity is expected to grow at an increasing rate over the medium term. Plantains are grown in relatively large quantities in all four islands. Grenada is a major exporter to Trinidad, however, the existence of Moko disease in that island creates a serious constraint for export to other countries. In terms of ability to produce relatively large volumes of a standard product in the other three islands, plantain has good potential. Plantain exports from the Sub-region in 1985 reached 5,670 tonnes, being the single largest fresh fruit exported, after bananas. Only 5% of these exports went to extra-regional markets.

be theoretically changed within a two year time span by introducing improved cultural and management practices, in practical terms it is expected that farmers are not likely to adopt higher cost innovations until they can be sure of a market for their fruits. Additionally, it is felt that it will take more than two years before public and private sector institutions are organized to offer the necessary services in planning, information, generation and transfer of the appropriate technologies. Given the transportation constraint, it is uncertain at this point whether markets can be assured in the near future.

In this context it is felt that joint marketing presents several difficulties. Before attempting joint marketing, a number of constraints must be overcome within each country of the Sub-region. These constraints must be approached, in some cases, by the individual countries while in others the problems may be attacked as joint efforts through multi-national projects.

The strategy proposed for overcoming the identified constraints is of a dual nature with both Sub-regional and country specific projects. In the first instance the projects are multi-national in nature and oriented towards the institutionalization of the necessary services to develop and maintain a dynamic fruit sub-sector. In the second instance the projects are oriented to resolve priority problems at the country level. They may be related to production and marketing of specific commodities for either export development, import substitution, or both.

In both cases, whether country specific or multi-national, projects will be market led, oriented to benefit small farmers and the rural sub-sector population, and will build upon past initiatives. Considerable emphasis will be given to improving inter-institutional coordination and optimizing the use of available resources at national, regional and international levels.

Seven project profiles are presented, as follows:

- 1) Integration and coordination of Sub-regional projects and activities for the development of the fruit sub-sector in the Windward Islands.
- 2) Determining priority fruit crops and production areas in the Windward Islands.
- 3) Improving efficiency in fruit nurseries of the Windward Islands.
- 4) Fruit crop germplasm bank for the Eastern Caribbean.
- 5) Generation and transfer of technology for priority fruit production and marketing in the Windward Islands.
- 6) Strengthening of farmers organizations in the Windward Islands.
- 7) Actions for the organized production and marketing of selected fruits in Dominica, Grenada, St. Lucia and St. Vincent.

ABBREVIATIONS

DEVELOPMENT AGENCIES AND REGIONAL PROJECTS

ACDI	Agricultural Cooperative Development Institute
ACT	Association for Caribbean Transformation Ltd.
APHIS	Animal and Plant Health Inspection Service
ART	Agency for Rural Transformation
BDD	British Development Division
CAEP	Caribbean Agricultural Extension Project
CAPRICAN	Caprican International (private charitable organization from Ottawa)
CARDATS	Caribbean Agricultural Research, Development, Advisory & Training Service
CARDI	Caribbean Agricultural Research and Development Institute
CARICOM	Caribbean Common Market
CATCO	Caribbean Agricultural Trading Company Ltd.
CCC	Caribbean Council of Churches
COGED	Caribbean Consultative Group for Economic Development
CCCU	Caribbean Confederation of Credit Unions
CDB	Caribbean Development Bank
CDC	Commonwealth Development Corporation
CDF	Canadian Development Foundation
CESO	Canadian Executive Service Overseas
CFC	Caribbean Food Corporation
CFCT	Caribbean Farmers Congress of Trinidad
CFTC	Commonwealth Fund for Technical Cooperation
CFWD	Canadian Foundation for World Development
Chinese	Technical assistance mission from Taiwan
CIDA	Canadian International Development Agency
CIP	Centro Internacional de Papas (International Potato Center, Peru)
CSC	Commonwealth Science Council
CUC	Cooperative Union of Canada
CUSO	Canadian University Service Overseas
CYMIT	International Maiz & Wheat Improvement Centre, Mexico
DCFRN	Developing Countries Farm Radio Network
EDF	European Development Fund (STABEX)
EEC	European Economic Community
EIB	European Investment Bank
FAO	Food and Agricultural Organization
French	French Technical Assistance Mission
FIT	Foundation for International Training (Canadian NGO)
Geest	Geest Industries Ltd. (shippers/distributors WINBAN bananas)
HIAMP	High Impact Agricultural Marketing & Production
HIVOS	Humanistic Institute for Cooperation with Developing Countries (Dutch)
IAF	Inter-American Foundation
ICRI	Inter-Pares Cross Roads International (Canadian NGO)
IDA	International Development Association, (World Bank)
IFAD	International Fund for Agricultural Development
IICA	Interamerican Institute for Cooperation on Agriculture

IMF	International Monetary Fund
INRA	Institut National de la Recherche Agronomique
IRFA	Institut de Recherches sur les Fruits et Agrumes
IVS	International Voluntary Services
LOME	African, Caribbean and Pacific Convention with EEC
NFUC	National Farmers Union of Canada
OAS	Organization of American States
OECS	Organization of Eastern Caribbean States
OXFAM	NGO, exist in USA, Canada and UK
PADF	Pan-American Development Foundation
PC	Peace Corps
POA	Partners of the Americas
PIP	Postharvest Institute for Perishables
PPI	Partners for Productivity International
Rockefeller	Rockefeller Foundation
STABEX	European Economic Community's Ag. Stabilization Fund
TDMI	Tropical Development and Research Institute
UCD	University of California, Davis
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
UWI	University of the West Indies
VOCA	Volunteers in Overseas Co-operative Assistance (USA)
WAND	Women and Development
WINBAN	Windward Islands Banana Growers Association
WOW	War on Want (England)

OTHER ABBREVIATIONS

AA	Agricultural Assistant
AI	Agricultural Instructor
AID	Agricultural Industrial and Development Bank (Dominica)
AIS	Agricultural Information System
AO	Agricultural Officer
COGA	Cooperative Citrus Growers' Association (Dominica)
CDL	Corona Development Ltd. (Dominica)
CGA	Coconut Growers Association
CMC	Chateaubelair Multipurpose Co-operative
CYFG	Chateaubelair Young Farmers Group
DBGA	Dominica Banana Growers' Association
DBMC	Dominica Banana Marketing Corporation
DEOSCS	Dominica Essential Oils and Spices Cooperative Society
DEVCO	Development Corporation
DEXIA	Dominica Export Import Agency
DFI	Dominica Food Industry
DFU	Dominica Farmers' Union
DHA	Dominica Hucksters Association
DOA	Division of Agriculture
DR	Dominican Republic
EDECC	Eastern District Extension Central Committee (Dominica)
FIC	Farm Improvement Credit

FTM	Farm-to-Market Ltd. (Dominica)
GCE	General Certificate of Education
GCNA	Grenada Co-operative Nutmeg Association
GDB	Grenada Development Bank
GMFC	Grenada Model Farms Corporation
MB	Marketing Board
MNIB	Marketing and National Importing Board (Grenada)
MOA	Ministry of Agriculture
MSCMS	Minor Spices Co-operative Marketing Society Ltd. (Grenada)
MSSD	Market Services Support Department (Dominica)
NAFWA	National Farmers Welfare Association (St. Lucia)
NDC	National Development Corporation (St. Lucia)
NDFD	National Development Foundation of Dominica
NOVAPORT	Canadian consulting firm on sea ports
NRDF	National Research and Development Foundation (St. Lucia)
ORD	Organization for Rural Development (St. Vincent)
OCDP	Orchard Crop Diversification Project (St. Lucia)
PCL	Produce Chemist Laboratory
PFU	Productive Farmers Union (Grenada)
RFNS	Regional Food and Nutrition Strategy
SFAD	Small Farmers Agricultural Development Project (St. Lucia)
SLAAL	St. Lucia Agriculturists Association Ltd.
SLEGA	St. Lucia Banana Growers' Association
SILDB	St. Lucia Development Bank
SIMB	St. Lucia Marketing Board
SPAT	Small Projects Assistance Team (Dominica)
STAFCO-OP	St. Lucia Association of Farmers' Co-operatives
SVALA	St. Vincent Arrowroot Industry Association
SVBGA	St. Vincent Banana Growers Association
SVMB	St. Vincent Marketing Board
SVMC	St. Vincent Marketing Corporation
TCDP	Tree Crop Diversification Project (Dominica)



TABLE OF CONTENTS

PART 1: INTRODUCTION		Page
1.	Background	
	Regional Food and Nutrition Strategy (RFNS).....	1
	Marketing Constraints.....	2
	Decision of Ministers of Agriculture of Windward Islands.....	2
	IICA/CDB Initiative.....	2
2.	Rationale for Windward Islands Joint Effort	
	Characteristics of the Windward Islands.....	3
	Economies of Scale.....	4
	Experiences of the Windward Islands Working together.....	4
3.	Methodology	
	The Food System.....	5
	Organization for the Study.....	6
	Study Execution.....	6
	Presentation of Information.....	7
4.	Conceptual Framework	
	Capacity of Production.....	8
	Quality of Production.....	8
	Costs of Production.....	9
	Secondary Markets.....	9
	Infrastructure/Transportation.....	9
	Organization at the National Level.....	10
	Organization at the Regional Level.....	10
PART II: Diagnosis		
1.	Macro and Organizational Structure	
	Crop Priorities.....	12
	Policies and Agreements.....	15
	Organizational Structure.....	18
2.	Preproduction, Production and Harvest	
	Preproduction.....	44
	Production.....	47
	Harvest Practices.....	52
3.	Postharvest Handling	
	Postharvest Handling Practices.....	69
	Postharvest Handling Infrastructure.....	70
	Recommended Postharvest Handling Conditions.....	72
4.	Domestic Marketing	
	Population and Tourism Trends.....	77
	Potential for Import Substitution.....	77
	Agro-processing.....	78

5.	Exports from the Windward Islands	
	Exports.....	84
	Exporters.....	86
	Transportation Alternatives.....	87
6.	Commodity Analysis	
	Mangoes (<i>Mangifera indica</i>).....	99
	Avocados (<i>Persea americana</i>).....	100
	Grapefruits, Lime and Orange (<i>Citrus sp.</i>).....	101
	Breadfruit (<i>Artocarpus altilis</i>).....	103
	Papaya (<i>Carica papaya</i>).....	105
	Passion Fruit (<i>Passiflora edulis</i> , f. <i>flavicarpa</i>).....	106
	Soursop (<i>Annona muricata</i>).....	106
	Pineapple (<i>Ananas comosus</i>).....	107
	Carambola (<i>Averrhoa carambola</i>).....	107
	Cashew (<i>Anacardium occidentale</i>).....	108
	Asean fruits (Mangoteem, Rambutan, Pullasan, Langsat, Durian).....	109
7.	Regional Experiences from CATCO and WINBAN	
	Caribbean Agricultural Trading Company Ltd.	110
	Windward Island Banana Growers Association.....	120

PART III: STRATEGY AND PROPOSED ACTIONS

1.	Strategy	
	Requisites.....	127
	Participants and their Roles.....	128
	Elements of the Strategy.....	131
	Projects and Activities Conforming the Strategy.....	133
2.	Proposed Actions	
	Proposed Actions at the Sub-regional Level.....	154
	Proposed Actions at the Country Level.....	156
	- Dominica.....	156
	- Grenada.....	161
	- St. Lucia.....	166
	- St. Vincent.....	171
	Project Profiles.....	175

TABLES

A-1	Demand of Selected Fruits from Selected Extra- Regional Markets and Sub-regional Supply, tonnes, 1985...	23
A-2	Recommended Production Environment for Selected Fruit Crops.....	24
A-3	Principal Indicators of the Environment in the Windward Islands by Environmental Factors and Country.....	27
A-4	Percentage of Total Land Area by Slope and Country.....	28
A-5	Percentage of Total Land Area in Categories of Land use by Country.....	28
A-6	Some Characteristics of Land in the Windward Islands by Country.....	29

A-7	Some Characteristics of Farms in the Windward Islands by Country	30
A-8	Agricultural Developmental Policies by Country	32
A-9	Past Project Experiences, On-going Projects, and Projects In-pine-line Relevant to the Production and Marketing of Fruit in the Windward Islands, by Country, March, 1987.....	34
A-10	Actions of Donor and International Agencies in Policy Areas by Country	36
A-11	Countries of the Sub-Region where Donor and International Agencies are Active.. ..	37
A-12	Number and Membership of Farmers Organizations and Type of Infrastructure and Services offered by them by Country 1986.....	38
A-13	Value of Services Provided by Banana Associations in the Windward Islands by type of Service and by Association, 1985.....	39
A-14	Identification of Banks, Development Institutions, and National Private Sector Organizations Supporting Farmers Organizations, by Country.....	40
A-15	Number of Posts and Vacancies of Technical Staff of the Ministeries of Agriculture (excluding forestry & fisheries) in the Windward Islands by Country, number and percent, 1986.....	41
A-16	Number and Percent of Actual Staff in Place (excluding forestry and fisheries) Ministry of Agriculture by Division and by Country.....	41
A-17	Number of Personnel, by Type, and Volume of Operations (1985) of Marketing Boards, by Country	42
A-18	Qualification of Selected Facilitating Services Offered by the Public Sector by Type of Service and Country	43
B-1	Capacity, Production and General Conditions of Nurseries in the Windward Islands, 1986.	53
B-2	Summary of the Propagation Process for Given Species in the Windward Islands, by Country... ..	54
B-3	Source, Condition and Availability of Seed, Budwood and Cuttings used by the Nurseries by Country in the Propagation of Fruit Trees, 1986.....	55
B-4	Most Important Cultivars being Propagated and Planted by Country in the Windward Islands.	56
B-5	Seasonality of some Fruit Species by Country in the Windward Islands.	57
B-6	Common Establishment and Cultural Practices used by Farmers in the Production of Non-banana Fruits by Country.....	58
B-7	Pests and Diseases of Quarantine Significance Affecting Fruit.....	60
B-8	Pests and Diseases of Economic Significance Affecting Production of Fruit.....	61
B-9	Pests and Disease of Economic Significance Affecting Quality of Fruit.....	62
B-10	Physical Factors of Economic Significance to Production and Quality.....	63

B-11	Production and Acreage of Selected Fruits in the Windward Islands by Country, tonnes, 1985.....	64
B-12	Projections of Acreage and Production (tonnes) of Selected Fruits under Existing Plans, by Country, 1995...	64
B-13	Number of Trees and Production per Acre of Selected Fruits in the Windward Islands and Other Major Producing Countries.....	65
B-14	Number of Citrus Trees and Acreage in Dominica, 1986.....	65
B-15	Comparative Advantage of Selected Inputs by Selected Countries January, 1987 (US\$).....	66
B-16	Most Common Methods of Harvesting, Fruit Crops and Tools Used during Harvest, by Country.....	68
C-1	Commodities Receiving Specialized Pre and/or Postharvest Handling in Preparation for Export, by Country.....	73
C-2	Characteristics of Selected Infrastructure Required for Postharvest Handling of Fresh Produce by Country 1986.....	75
C-3	Harvest Indices and Recommended Postharvest Handling Conditions (1) for Selected Fruit Crops.....	76
D-1	Population and Number of Tourists by Means of Transportation and by Country, 1976 & 1985.....	80
D-2	Value (EC\$ 000) of Imports of Fruits and Fruit Products by Country, 1975-1985.....	81
D-3	Value (EC\$) of Imports of Fresh Fruits and Fruit Products by Type Product and by Country, 1985.....	81
D-4	Quantity (tonnes) of Fruits Processed by Agro-industries (1) by Species and by Country, 1985.....	82
D-5	Fruits used in Agro-processing (1) by Type Output and by Country.....	83
E-1	Index of Volume of Exports of Fresh Produce by Country Commodity Group and by Years (1975-1985).....	89
E-2	Exports of Fresh Produce (excluding UK bananas) in 1985 in comparison with 11 year (1975-1985) Average, tonnes.....	90
E-3	Fresh Produce Exports from the Windward Islands by Commodity and Country of Origin, 1985, tonnes & %	91
E-4	Fresh Produce Exports (excluding UK bananas) from Sub-Region by Destination and Country of Origin, tonnes and %, 1985.....	92
E-5	Fresh Fruit Exports (excluding UK bananas) from the Sub-Region by Destination and Country of Origin, tonnes and %, 1985.....	93
E-6	Exports of Fresh Produce (excluding UK bananas) from the Windward Island Sub-Region by Commodity, Country and by Destination, tonnes, 1985.....	94
E-7	Exports of Fresh Produce (excluding UK bananas) from the Windward Island Sub-Region by Commodity and by Destination, percent, 1985.....	95
E-8	Exports Fresh Produce (excluding UK bananas) from Windward Island Sub-region by Type Exporter and Country of Origin, tonnes and %, 1985.....	96

E-9	Transportation Alternatives for Fresh Produce from the Windward Islands by Sea, by Air and Country, February, 1987.....	97
E-10	Actual Sales of Produce by CATCO by Destination, Commodity and Financial Year (kg).....	113
E-11	Sales of Produce by CATCO by Destination, Commodity and Financial Year (Barbados \$).....	114
E-12	Sales of Produce by CATCO in Extra-Regional Markets by Commodity Group and Financial Year (percent).....	115
E-13	Sales of Produce by CATCO by Country of Origin and Financial Year (percent).....	116
E-14	Sales of Produce by CATCO by Country of Destination and Financial Year (percent).....	116
F-1	Major Areas Requiring Action in Respect to Macro-Environment and Organisational Structure.....	138
F-2	Major Areas Requiring Action in Respect to Pre-Production, Production and Harvesting.....	141
F-3	Major Areas Requiring Action in Respect to Postharvest Handling.....	143
F-4	Major Areas Requiring Action in Respect to Domestic Marketing.....	144
F-5	Major Areas Requiring Action in Respect to Export Marketing.....	145
F-6	Summary of Priority Constraints, Actions to be Taken, Assisting Institutions and Present Status of Actions.....	147
F-7	Summary of Required Actions to Develop the Non-Traditional Fruit Sub-Sector, by Area.....	153
F-8	Favourable and Unfavourable Conditions in the Areas of Markets, Production, Postharvest and Services for Tree Crops in the Windward Islands.....	155
F-9	Identification of Favourable and Unfavourable Conditions in the Areas of Marketing, Production and Postharvest Handling of Selected Tree Crops, Dominica.....	157
F-10	Identification of Favourable and Unfavourable Conditions in the Areas of Marketing, Production and Postharvest Handling of Selected Tree Crops, Grenada.....	162
F-11	Identification of Favourable and Unfavourable Conditions in the Areas of Marketing, Production and Postharvest Handling of Selected Tree Crops, St. Lucia.....	167
F-12	Identification of Favourable and Unfavourable Conditions in the Areas of Marketing, Production and Postharvest Handling of Selected Tree Crops, St. Vincent.....	172
F-13	Titles of Project Profiles and Duration of Implementation Period.....	176

FIGURES

Figure 1:	Conceptual Framework for the Study of the Production and Marketing of Fruit in the Windward Islands.....	10A
Figure 2	Participants of a Sub-Regional Fruit Sub-Sector Development Strategy.....	128A

PROFILES

1. Integration and Coordination of Sub-Regional Projects and Activities for the Development of the Fruit Sub-Sector in the Windward Islands.....	178
2. Determining Priority Fruit Crops and Production Areas in the Windward Islands.....	181
3. Improving Efficiency in Fruit Nurseries of the Windward Islands.....	185
4. Fruit Crop Germplasm Bank for the Eastern Caribbean.....	189
5. Generation and Transfer of Technology for Priority Fruit Production and Marketing in the Windward Islands.....	194
6. Strengthening Farmers Organisations in the Windward Islands....	198
7. Formulation of Projects for Organised Production and Marketing of Selected Fruits at the Country Level.....	203

APPENDICES

1. Conclusions by Country: Dominica	1-22
2. Conclusions by Country: Grenada	1-21
3. Conclusions by Country: St. Lucia	1-21
4. Conclusions by Country: St. Vincent	1-17
5. Trade Statistics by Country: Dominica	1-6
6. Trade Statistics by Country: Grenada	1-5
7. Trade Statistics by Country: St. Lucia	1-5
8. Trade Statistics by Country: St. Vincent	1-10
9. Basic Information on Farmers Organisations by Country	1-5

THE FRUIT SUB-SECTOR IN THE WINDWARD ISLANDS *

Diagnosis - Strategy - Actions

PART I: INTRODUCTION

1. BACKGROUND

1.1 Regional Food and Nutrition Strategy (RFNS)

The Caribbean Regional Food and Nutrition Strategy (RFNS), conceptualized in 1975, is an effort by the CARICOM Heads of Government to redress the food problems on a regional basis. The Strategy aims at improving the nutrition of the population, import substitution, increased employment, increased trade, and income generation.

The RFNS, therefore, provides a framework within which the major economic and health problems experienced in many countries of the Caribbean Community can be addressed. From the point of view of the Strategy, the food and agriculture sector is of critical importance to the resolution of these problems, since in the case of most CARICOM countries agriculture is still the major economic activity.

The major elements which have been incorporated in such a developmental strategy in order to achieve its purpose are:

1) Increased National Production

This requires initially, the development of consistent policies to make Caribbean economies more competitive, to improve their balance of payments, to create significant linkages between the productive sectors as well as between production and consumption and to increase employment;

2) Regionalism

This implies joint efforts in production and joint external economic policies and actions to market such products in national, regional and extra-regional markets;

3) Employment Creation

This includes the creation of new jobs in production, marketing, agro-processing and in the service sector.

4) Increased "People" Participation

This requires specific measures for generating "People" participation and communication processes which involve the people intimately in decision making, e.g. through agricultural organizations; and

5) Satisfaction of Basic Needs

The satisfaction of basic needs of the population in areas such as food, housing and clothing as well as their requirements for basic services.

* Jerry La Gra, Marketing/Rural Development Specialist, IICA, St. Lucia.
Rafael Marte, Fruit Production Specialist, IICA, Barbados.

The strategy proposed here can be considered a sub-set of the wider strategy since it attempts to achieve, through a sub-regional approach, some of the basic objectives of the RFNS.

1.2 Marketing Constraints

The domestic, regional and extra-regional trade have been developed largely by small operators with very little assistance from Government or other institutions. Consequently, trade has grown relatively slowly and is based on trial and error, with each entrepreneur attempting to maximize returns while minimizing risk and investments.

Domestic marketing takes place through a mixed system of municipal markets, small vendors and supermarkets. Due to the small size of the national markets, and considerable competition between small farmers, prices are not particularly remunerative and, therefore, are not strong incentives to increase production for local sales.

The low volume of domestic production in relation to world production constitutes a constraint to extra-regional exports. This means that competitive strategies must be based upon ~~high-quality produce~~, ~~competitive prices~~, ~~attractive packaging~~ and reliable delivery schedules. ~~None of these characteristics can be guaranteed with the existing marketing infrastructure and systems.~~

1.3 Decision of Ministers of Agriculture of Windward Islands

The decision of the Ministers of Agriculture of the Eastern Caribbean States to request a Market Study was not an accidental outcome of their 1983 meeting. The foregoing considerations and, more particularly, the increased fruit-tree crop production capability which arose in the islands of Dominica, Grenada, St. Lucia and St. Vincent and the Grenadines as a result of Government initiated projects, helped crystallise the idea.

Moreover, the Ministers of the four Windward Islands were encouraged by the tangible achievements of the Windward Islands Banana Association through the joint marketing of bananas on the UK market. Added to this, it seemed clear that penetration of the extra-regional market could only be achieved through a ~~systematic approach~~ which ~~addressed simultaneously the~~ ~~organisation problems~~, the supply problems and the ~~postharvest~~ ~~problems~~ ~~along with the trading arrangements.~~

At the 1983 Regular meeting of the Inter-American Board of Agriculture in Jamaica, the Minister of Agriculture from St. Vincent, speaking for the Ministers of the Windward Islands, requested IICA's technical cooperation in the area of joint marketing of agricultural commodities.

1.4 IICA/CDB Initiative

The IICA/CDB Association originated in 1980 through the instrument of a Memorandum of Understanding for Cooperation in establishing a regional facility for the purpose of:

- Assisting the Member States and Territories of CDB in overall, medium and long term policy formulation and project identification in agriculture and rural development;
- Developing, together with relevant local institutions, agricultural and rural development projects to be submitted for external financing to CDB and other international and bilateral institutions;
- Providing management assistance for those projects for which appropriate funding had been secured; and
- Providing strong training support to Member States and Territories of CDB in the areas referred to above.

The IICA/CDB Understanding expired by effluxion of time in February, 1984.

Given the high priority for developing improved extra-regional marketing systems for non-traditional export crops, IICA/CDB agreed to carry out jointly a production/marketing study of selected fruits in the Windward Islands. An agreement to implement the study was prepared in 1985 and officialized on January 13, 1986. IICA and CDB staff welcome this new opportunity to collaborate and cooperate to further advance the agricultural development prospects of the economies of the Eastern Caribbean.

2. RATIONALE FOR WINDWARD ISLANDS JOINT EFFORT

2.1 Characteristics of the Windward Islands

The four Windward Islands share a fairly common history. They have experienced all forms of political institutional arrangements to be found in the experience of the English-speaking islands. They have progressed from Crown Colony Rule to a Windward Islands Federation and later on, to a West Indies Federation, then to Associate Statehood and finally, Independence.

For the most part the population is rural with a concentration around one or a small number of urban centres. Together, the Windward Islands had a combined population in mid-1984, of 419,900.

Not only do the four islands share a common political heritage but their economic, social and political institutions and structures are largely a legacy of their colonial experience. Given their common heritage, the problems faced by them are essentially similar.

The four islands are predominantly agricultural relying on extra-regional exports of a few agricultural commodities, namely banana, cocoa, nutmeg and citrus and on extra-regional imports to satisfy most of their domestic requirements, including food. Although attempts to diversify their economies have been made, their success with manufacturing and tourism have not been very startling.

Agriculture's contribution to GDP in 1984 was 13.9% in St. Lucia, 19.9% in St. Vincent and the Grenadines, 21.7% in Grenada and 35.2% in Dominica. As a consequence, agriculture is a significant employer of labour in all four

islands and also creates opportunities for self-employment on small family farms.

The four islands are located between latitudes 12 and 16 degrees N and longitudes 60 and 62 degrees W. Their rugged topography, humid climate and predominantly volcanic soils favour a tree crop system of farming, since arable lands are generally very limited.

2.2 Economies of Scale

The total land mass of the four islands is approximately 2,099 square km with Grenada being 345 sq.km, St. Vincent and the Grenadines 388 sq. km, St. Lucia 616 sq. km and Dominica 750 sq. km.

Since not all the land area is suitable for agricultural production, the production capability of any one territory is not large enough to make a significant impact on the World Market with any one commodity. On the other hand, the pooling of their production capabilities, although still small by world standards, is more likely to achieve levels of production which would permit penetration of the export markets.

The infrastructure in all four islands is not fully developed, particularly in the areas of road communications, storage and port facilities.

The external transportation network provides limited air and sea links with the outside world and so exporting becomes a very exacting activity if one is to capitalise on the few opportunities open to these island economies.

Production of export crops, nevertheless, is considered a crucial element since it provides the foreign exchange required to purchase production inputs and foods considered important but which cannot now be produced in the sub-region, as well as for servicing other sectors of the economy.

2.3 Experiences of the Windward Islands Working Together

The four islands have a common bond as Members of the sub-group - The Organisation of East Caribbean States (OECS) - which operates among them, the East Caribbean Common Market (ECCM). The ECCM, established in June, 1968, by the Governments of Antigua, Dominica, St. Christopher/Nevis/Anguilla, St. Lucia and St. Vincent. The signatory Governments recognised then, and more so today, "the need for concerted action in order to guarantee steady expansion, balanced trade, fair competition and equitable distribution of gains."

The objectives of the ECCM are to:

1) Promote in Member States:

- harmonious development of economic activities;
- continuous economic expansion;
- fair distribution of benefits derived from the common market;
- increased economic stability;

- accelerated improvement in the standard of living; and
- close economic relations.

2) Facilitate the maximum interchange of goods and services by the progressive approximating of the economic policies of Member States.

Within recent times, there has been increasing cohesiveness in the subgroup an example of which is the functioning and operation of the Windward Islands Banana Association (WINBAN).

3. METHODOLOGY

3.1 The Food System

The study of the production/marketing of fruits in the Windward Islands followed a commodity systems approach. The food system in this case was considered to include all the entrepreneurial and facilitating activities involved at the pre-production, production, postharvest handling, processing and marketing levels. In other words, it includes all those actions taking place from the planning of production through to the point of retail to consumers.

Given this broad definition of the fruit production/marketing system, a wide diversity of participants come into play. These participants can be broadly categorized into four groups, based on similar characteristics and common interests. Whereas the first two groups are motivated primarily by the profit motive, the third and fourth groups are service and development oriented.

Group A: Capital deficient private sector participants

Includes small farmers and owner/operators of small agro-processing operations. These are characterized by being suppliers of small volumes of a wide variety of products. Since their resources are scarce and access to resources and services are difficult, this group tends to be conservative and minimizes investments and risk.

Group B: Capital intensive private sector participants

This group includes large farmers, importers, exporters, wholesalers, retailers and owners of large-scale agro-processing operations. They tend to deal in relatively large volumes and have relatively easy access to resources and services.

Group C: National development institutions

This group includes public sector institutions, such as the MOA and the marketing boards, as well as non-governmental organizations assisting in the development process,

Group D: Donor, regional and international agencies

Within this category fall a wide range of institutions providing financial and technical assistance to both private and public sector institutions.

3.2 Organization for the Study

Under the IICA/CDB agreement, overall supervision of the study was the responsibility of a liaison entity consisting of the IICA Director for the Windward Islands and the Director of CDB's Projects Department.

A technical committee, comprising the IICA marketing specialist in St. Lucia and the Manager of the Agricultural Division of CDB's Project Department, was to plan and organize the study. The IICA marketing specialist was responsible for overall study coordination and execution.

The organization, planning and study supervision, at the country level, was carried out by the IICA marketing specialist (St. Lucia) and the IICA fruit production specialist (Barbados). The coordination of national consultants was undertaken through IICA offices in Dominica, Grenada and St. Lucia and through the MOA in the case of St. Vincent.

3.3 Study Execution

Prior to the signing of the IICA/CDB agreement, the IICA marketing and fruit production specialists met in St. Lucia and prepared a detailed outline of the desired content of the final report document. During the period October-December 1985, a case study was implemented in St. Lucia to generate the desired information. Based on this experience, detailed terms of reference were then prepared to generate the desired information on the following topics in each of the Windward Islands:

- a) Natural resources
- b) Human resources
- c) Crop characteristics
- d) Plant propagation
- e) Cultural practices
- f) Biological and physical factors affecting fruit quality
- g) Farmer organizations
- h) Domestic markets and marketing
- i) Agro-processing
- j) Trade information
- k) Institutional analysis

When the IICA/CDB agreement was formalized on January 13, 1986, the methodological approach had already been developed, tested and modified. It was therefore possible to initiate research activities immediately in the remaining three islands and to collect missing information on fruit production/marketing in St. Lucia.

On the first visit to each state, the IICA Director for the Windward Islands and the marketing specialist met with MOA decision making personnel to review study objectives and to identify priority fruits and participating nationals. Adjustments were made in each case to meet local conditions and interests.

The following step was to identify and interview potential participants in the study and to analyze with them their respective terms of reference. Each participant was selected based on his/her knowledge and experience in

the particular area of interest. In some cases the participants were employees of the public sector and in others they were private consultants. In all cases they were nationals or people from the region. Fees were paid based on time and difficulty of assignment. Public sector employees were asked to take leave-time to complete their contractual obligations.

The consultants were not asked to write reports but to generate information following their individual terms of reference. In essence, each consultant wrote a chapter of a country report along pre-determined lines. It was then the responsibility of the two IICA specialists to fit the pieces together into separate country reports which serve as the basis for the preparation of this document.

The IICA specialists visited each of the Windward Islands at least four times between February and July 1986. During these visits meetings were held with the individual consultants and basic documents were reviewed, modified and, where necessary, additional information solicited. It was during these visits and meetings that many of the project ideas identified in this report surfaced.

A preliminary version of the diagnosis was prepared and discussed with participants in the study. The decision was made to take full advantage of the available information and prepare a more comprehensive document.

On May 8, 1987 a meeting of IICA specialists and representatives of the MOA from Dominica, Grenada and St. Lucia met in St. Lucia to review the final draft of this document. A similar meeting was held on May 19, 1987 between IICA and CDB staff. Based on observations of MOA and CDB staff, modifications were introduced into this final version.

3.4 Presentation of Information

This study has generated a tremendous amount of new information of use to decision makers in each country and the Sub-region. The country documents which served as the basis for the preparation of this report are available at the respective IICA offices and will be made available to all interested users. It is hoped that these Country Documents will eventually grow into a permanent information base in each country.

In addition to the four country documents and this summary report, IICA generated information which will be edited and published in separate documents. These publications are:

- a) Fruit tree crop survey in St. Lucia.
- b) An annotated bibliography of publications dealing with production/marketing in the Eastern Caribbean.
- c) Profiles of farmer organizations in each of the Windward Islands.

This report is divided into three parts: Part I is the Introduction now being read, it ends with the Conceptual Framework for the Diagnosis. The results of the diagnosis are presented in Part II. Within Part II, conclusions are presented by area, i.e macro-environment and organisational structure; pre-production, production and harvesting; postharvest, and

marketing, by commodity and by regional organization. Part III presents a proposed strategy for dealing with the identified production/marketing constraints and seven Project Profiles outlining the key elements of the Sub-regional strategy. This strategy is based on a series of summary tables (F-1 to F-5) which identify "major areas requiring action," by country, indicating the priority areas. Nine appendices are included as part of the diagnosis. The first four present summary conclusions by country (summarized from each of the four Country Documents). The second four appendices present Trade Statistics (1975-85) for each of the Windward Islands and the last appendix presents basic information on farmers organizations in each of the four islands.

4. CONCEPTUAL FRAMEWORK

Successful marketing necessitates being able to supply continuous volumes of quality produce at competitive prices, making the product available at the proper place and at the proper time. The concept of Joint Marketing implies that two or more parties will benefit to a greater degree by marketing together than they would by marketing separately. Joint marketing, under the proper circumstances, may have certain advantages. For example, joint marketing might permit a group of suppliers to meet the demand for large volumes of produce that individual suppliers could not. Joint marketing can also improve the economies of scale so that the group as a whole can introduce new technologies, reduce operating costs or take advantage of large volume shipping rates, thus becoming more competitive.

While there are distinct advantages to Joint Marketing, there are also disadvantages. With more than one person or entity involved in the marketing operation, decision making may become more complex, leading to delays, which cost money. When Joint Marketing includes multiple countries, and when the public sector becomes involved, the potential for problems increases significantly.

Joint Marketing, therefore, is not something to take lightly, nor is it likely to be a panacea. Joint Marketing has all the complications of marketing per se, plus the added problems and difficulties which can arise whenever integration and coordination are required between organizations having distinct interests, resources and objectives.

Given this concept, any attempt to evaluate the feasibility of Joint Marketing in the Windward Island sub-region should look carefully at the following variables:

4.1 Capacity of Production

The penetration of international markets requires a minimum volume of production. Although individual islands may be unable to produce significant volumes of fruits on their own, the four Windward Islands together may be able to do so.

Some key questions which must be asked are:

- What is the actual production of selected fruits?
- What is the potential production of selected fruits?

- What are the natural resource constraints?
- What are the farming systems constraints?

4.2 Quality of Production

Production, even when available in large volumes, may not be up to international standards due to inferior quality (size, maturity, brix, colour, appearance, etc.). In studying the feasibility of joint marketing, it is necessary to evaluate product quality (actual and potential) and analyze those variables which impact upon quality. Some of these variables are the following:

- Type of planting material.
- Farming systems used by the grower, e.g. intercropping.
- Cultural practices used by the farmer in production.
- Pest and disease problems.
- Harvesting and postharvesting handling of the commodity.

4.3 Costs of Production

The ~~international~~ markets for fresh produce are extremely competitive. ~~Some developing countries are producing fruits for the same market.~~ Some of these countries have ~~comparative advantages in terms of climate, soils, labour costs, and other factors which are agricultural sector inputs and outputs.~~

If the exporting countries are not ~~competitive in response to the needs of~~ ~~consumption~~ joint marketing will not be possible without special ~~marketing concessions~~. Therefore, an ~~analysis of production costs is still~~ ~~quite~~ ~~important~~ to ~~consider~~ in evaluating the feasibility of a joint ~~marketing~~.

4.4 Secondary Markets

Export development requires a clear export development policy and production oriented towards the export market. A successful export program cannot be based upon surplus from the domestic market.

Under the best of conditions not all of the production of an export program will be exported. ~~Significant quantities of non-exportable produce will be consumed on the domestic market, either for processing, home or animal consumption or for disposal.~~ This is especially important in small countries with small domestic markets which can ~~easily be flooded by exports.~~

Since the difference between success and failure of an export program may hinge upon the use of the non-exportable produce, secondary markets must be considered.

Some key questions to be asked are:

- What is the capacity of absorption of non-exportable produce on the domestic market?
- What is the potential of the tourist trade for absorbing fresh or processed fruits, e.g. hotels, cruise ships?
- What is the potential for transforming the product through agro-processing and marketing domestically, regionally or extra-regionally?

4.5 Infrastructure/Transportation

Effective marketing requires making the commodity available at the proper place and at the proper point in time. Time and place utility are made possible by having proper infrastructure for storage, postharvest handling and adequate transportation facilities.

Effective Joint Marketing will require some minimum infrastructure at the national level, as well as national, regional and extra-regional transport facilities - seaports, airports and air and sea lines.

4.6 Organization at the National Level

A Joint Marketing effort from the Windward Islands will require a clear definition of agricultural policy in each participating country, as well as an effective organization and co-ordination between diverse institutions of the public and private sectors to implement said policies. Participating or facilitating institutions will most likely include the Ministries of Agriculture (MOA), Marketing Boards (MB), Port authorities, Political and Planning authorities, Banks, farmers' organizations and exporters, among others. The feasibility or otherwise of inter-island joint marketing may well depend upon the effectiveness of some of these different organizations.

An analysis of the structure and potential effectiveness of key organizations is fundamental to determining the feasibility of a Joint Marketing venture.

4.7 Organization at the Regional Level

Joint Marketing from the Windward Island sub-region will require some institutionalized structure at this level as well as facilitating services, co-ordinated at the regional level.

Support services may include research, technical assistance, jurisprudence, information and marketing expertise, among others.

Any evaluation of the feasibility of Joint Marketing from the Windward Island Sub-region should include the identification of existing institutions, organizations, resources and experiences within the region, which can support a joint production/marketing effort.

4.8 Summary

Figure 1 provides a graphic presentation of the production/marketing system required for effective Joint Marketing from the Windward Island sub-region and its macro-environmental support system. This model indicates that for sufficient volumes of quality produce to reach regional and extra-regional markets opportunely, and at competitive prices, a series of conditions must be met. These conditions are summarized below.

4.8.1 National Level:

- 1) Organizational Structure and Macro-environment:
 - The macro-environment must facilitate production and marketing.
 - The public and private sectors must be satisfactorily organized at the national level.
 - Relevant national policies must be clearly defined and operative.
 - Certain facilitating services must be available and efficient.
- 2) Preproduction/Production/Harvest:
 - Adequate facilities must be in place to produce quantity and quality planting materials of the right type.
 - Cultural practices must be sufficient to meet the demands of the intended market.
 - Pests and diseases of quarantine significance must be absent or under control.
 - Production costs must permit price competition on the intended market.
 - Fruits of the right cultivars must be produced at the proper time to permit market penetration.
- 3) Postharvest Handling:
 - Minimum infrastructure must be in place to allow the maintenance of the quality of the product, at competitive costs.
 - Human resources must have the necessary skills to operate the infrastructure and equipment and to efficiently handle the commodity from harvest to the point of export.
- 4) Export:
 - Adequate infrastructure must be in place.
 - Regulations must be clear and effectively followed.
 - Alternative arrangements must be in effect to handle non-exportable produce.
 - Adequate transportation networks must be in place.

4.8.2 Regional Level

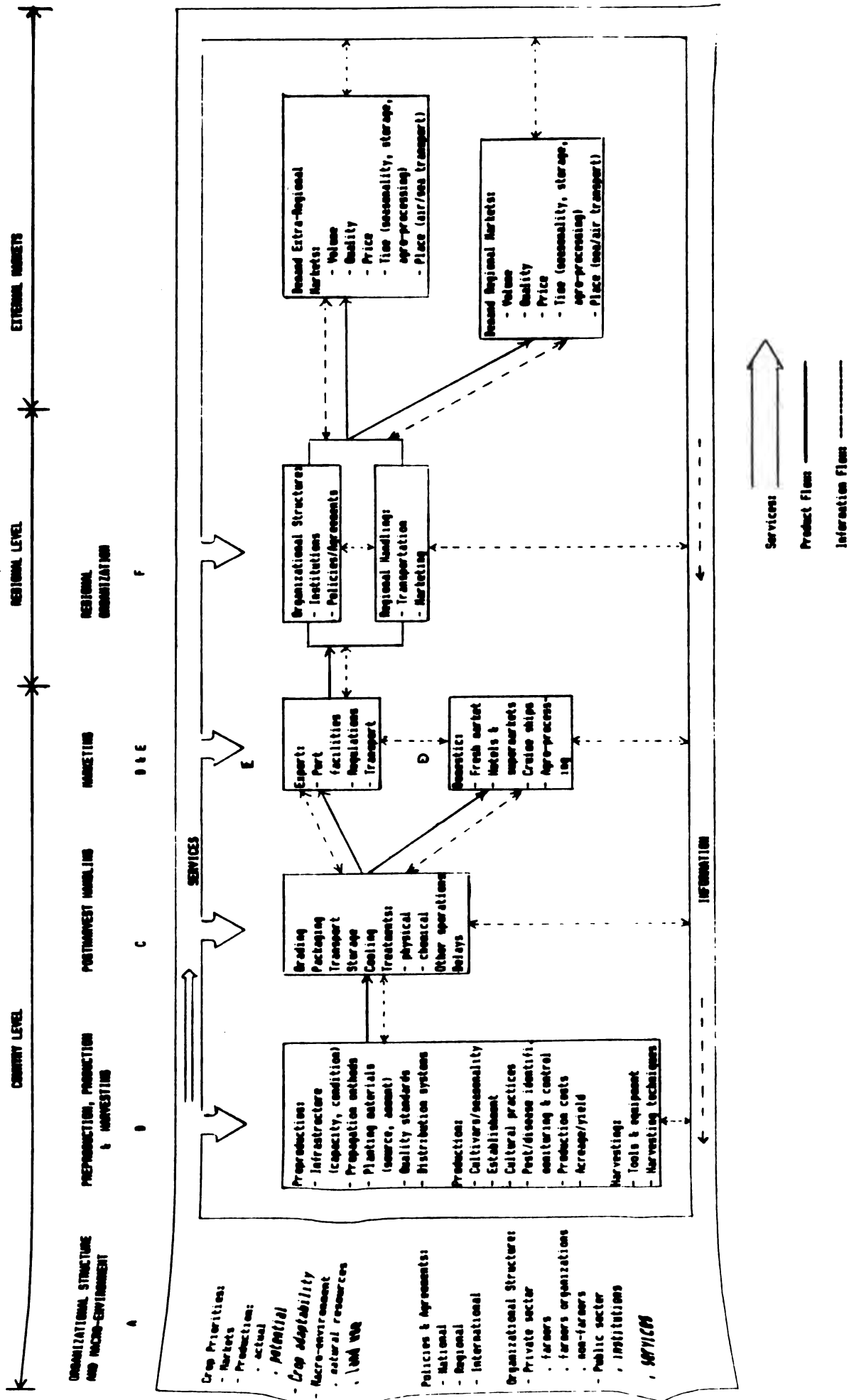
Organizational structure:

- Policies and agreements between countries must be arranged.
- An institutional structure must be in place to execute the agreements, to handle the operational aspects and to provide the necessary services, information and co-ordination.
- A satisfactory transportation and marketing arrangement must be operational.

An important point to stress here is that Joint Marketing of produce from several countries can only occur if satisfactory conditions for production and marketing exist at the country level. Although the lack of markets and marketing may be the critical problem, there are no "marketing" solutions, only integrated solutions, and these begin at the country level.

In the following diagnosis of the production and marketing of fruits in the four Windward Islands, an effort is made to identify principal constraints, alternative solutions and the feasibility of joint marketing arrangements.

FIGURE 1: CONCEPTUAL FRAMEWORK FOR THE STUDY OF THE PRODUCTION AND MARKETING OF FRUIT IN THE WINDWARD ISLANDS



PART II

DIAGNOSIS

The diagnosis is divided into seven sections. The first five deal with areas within the commodity systems approach, these are:

- organizational structure & macro-environment;
- preproduction, production & harvest;
- postharvest handling;
- domestic marketing, and
- export marketing.

The sixth section deals with the individual commodities which were given attention in the study. Section seven takes a brief look at regional marketing activities, namely CATCO and WINBAN.

The first five sections are each divided into two parts, the first part presents the analysis, conclusions and a summary table identifying needs to overcome the constraints; the second part presents the Tables which correspond to the analysis. The commodity section presents a summary of the demand and supply situation for each one of the commodities and identifies priority areas for action related to the specific commodity.

1. MACRO-ENVIRONMENT & ORGANIZATIONAL STRUCTURE

1.1 Crop Priorities

1.1.1 Markets

In many developing countries there exists a mistaken feeling that exports can be increased by three easy steps:

- 1) Send a government mission abroad or hire a consulting firm to identify the market;
- 2) Identify specific importers and determine their standards, and
- 3) Send trial shipments.

This procedure has been followed in each one of the Windward Islands with the following results:

- 1) Scarce resources have been spent on trade missions and consultancy reports.
- 2) Reports identifying markets and listing importers have been published. *
- 3) Although trial shipments have been made, the capacity for follow up shipments has been minimal.

* "Dominica market study," AGRODEV-Canada Inc., July 1986. "Test marketing of selected agricultural items from St. Lucia in the UK and West Germany," FINTRACT Consulting Ltd., December 1985. "Report on a market survey, product identification and implementation strategy St. Lucia," FINTRAC, July, 1983. (continued at bottom of next page). "The Canadian market for fresh fruits and vegetables," D. Benwell, Bureau de promotion du Commerce, Canada, August, 1981. "Study of tropical fruit and off-season vegetables on the european market," COLEACP, Brussels, June 1981. "The UK market for tropical fruits and vegetables from Barbados," J.S. Lohar, IICA, February, 1981.

The strategies applied by governments to increase exports of non-traditional fresh produce, in general, have met with little success. People are learning that although markets may exist, the islands do not have the capacity to meet the demand due to one or more of the following reasons:

- 1) Inability to supply the volumes desired.
- 2) Inability to maintain consistent quality of product.
- 3) Inability to compete in terms of price.
- 4) Inadequate transportation network.

This situation can lead us to conclude that ~~existing studies~~ in the first instance, ~~should be of a sub-regional level and should be utilized to study national crop priorities~~, i.e. crops for which the country has comparative advantage in production and marketing. Once ~~comparative advantages are determined at the national level, there may be a need for a comprehensive analysis of the intended market.~~

Market studies were not a part of the terms of reference of this study, however, some macro data was obtained from the literature. ~~Table A-1 presents some information on total exports of selected fruits into three extra-regional markets in comparison with extra-regional exports from the Windward Islands.~~

Some conclusions that can be obtained from Table A-1 are the following:

- 1) Total extra-regional exports from the Windward Islands (excluding UK bananas) are very, very small and with the exception of breadfruit are unlikely to have any significant impact upon market conditions in the extra-regional markets.
- 2) Given the smallness of the exports from the Sub-region, more attention should be given to developing ethnic and other speciality markets which absorb relatively small quantities of fresh produce.
- 3) Since the Sub-region will not be able to compete with large producing countries, e.g. Brazil, Israel and others, the islands should stress production for "market windows" where prices tend to be higher and competition less.
- 4) The Windward Islands are the major suppliers of the UK market with breadfruit.

1.1.2 Production

An overview of the markets and marketing conditions is one indicator in the selection of crop priorities. Given this "market frame of reference" the next question to be asked is: What is the production potential in the Windward Island Sub-region to meet this demand?

The analysis in section 2.2.4 indicates that ~~statistics on fruit production in the four islands~~ are either unavailable or unreliable. We do ~~not know the number of trees or the average income of the countries, nor do we know the yield per tree per annum.~~ The collection of such data is complicated due to the ~~substructure of plantings, the variety of cultivars, and relatively poor cultural practices,~~ which ~~adversely affect yields.~~ Any published statistics on fruit production within the sub-region can be highly misleading as they may be either one persons "guesstimates" or may refer to particular introduced cultivars, therefore excluding the many wild trees.

Another source of information on production potential is that from trade statistics (Chapter E & Appendices 5-8). Although trade statistics are more reliable than production statistics, they only tell us how much "is" being exported. Although they give an indication of overall production, they do not permit the determination of the unharvested produce, postharvest losses or the amounts sold on the domestic markets.

1.1.3 Crop adaptability/Macro-environment/Land use

The study concentrated mainly on the traditional fruit species, including ~~orange, banana, guava, mango, pineapple, papaya, and mango~~ orange, banana, guava, mango, pineapple, papaya, and mango. Table A-2... ~~summarizes the environmental requirements for these species~~ including such factors as temperature, water requirement, wind tolerance and soil type. Table A-3 presents the environmental ~~conditions~~ by country, as they actually exist. A comparison of these two tables shows that all four of the Windward Islands have ecological conditions ~~favorable for the production of a wide range of fruit crops~~. However, within each country there is a wide variation of environmental conditions between regions. Traditionally, fruit crops are found spread throughout each country, often in areas not suitable for their production. Very little effort has been made to ~~systematically identify and~~ ~~investigate~~ ~~production in these areas~~ ~~to determine~~ the production/potential of each species.

The four Windward Islands are of volcanic origin and the terrain, in general, tends to be very steep. Available data (Table A-4) shows that at least 42 percent of the lands have slopes of 20% or greater and in the case of Dominica this percentage reaches approximately 85%. Consequently, land capability studies (Table A-5) throughout the sub-region strongly recommend the production of tree crops, pasture or natural forest on 70% or more of the land area in each country.

Tables A-6 and A-7 presents some characteristics of land and land use in each of the Windward Islands. Between 31 and 42 % of the land area in each country is held in farms. This relatively low percentage is again a sign of the ruggedness of the terrain. Significant amounts of land are controlled by Governments, varying from 7% of the land in farms in Dominica and St. Lucia to 11% in Grenada and 30% in St. Vincent. Average farm size is small, ranging from 4.2 acres in Grenada to 9.0 acres in Dominica. Considering that farms are often made up of more than one plot, the average size piece of farm land is much smaller still.

Efforts are being made by governments to redistribute land to small farmers but land distribution continues to be greatly skewed with a very large number of farms less than 5 acres in size accounting for a relatively small percentage of the total area of farmland. While census data report that most farms are considered to be owned, in fact, a very high percentage of farms are without legal title. Only in St. Lucia, under the current land titling project, is this situation undergoing change. In general, land in the Windward Islands is intercropped with between 2 and 8 major crops and often many other minor crops. Principal crops are banana, coconut, cocoa, citrus and nutmeg. These

five cases represent about the only instances of concentrated stands of trees, and these vary from island to island. In the case of mango, avocado, breadfruit and other exotics, the average number of trees per farm will vary from a few (1-5) to 30 or so. This type of land use, ~~and the average size of farms, makes a serious contribution to the~~ planning and the development ~~steps and indicates the importance of~~ ~~consistency.~~

1.2 Policies & Agreements

1.2.1 National

Table A-8 summarizes country policies in ten policy areas. The similarities between the four Islands are striking, not only in the well defined policy areas but in the others as well. The four Islands all seem to give priority to ~~diversification~~ and the principal methods to be used in reaching this target are ~~land reform, import substitution and export development~~. In all cases the Governments are involved in dividing up estates under ~~their~~ control into family farms. They are placing controls on selected imports to ~~promote import substitution and~~ they are providing some incentives to local production of ~~domestically~~ imported items. In the case of export development, attempts are being made to provide ~~facilitating services and identify target commodities~~. Another area where national policy seems to be fairly clear is that related to natural resource protection.

Areas where national policy remains undefined or rather hazy are those of agro-processing and marketing. Here there is considerable variation by country. Dominica seems to have the clearest policy of the four in both of these areas although marketing policy still has some uncertainties. In the case of agro-processing, the Produce Chemist Labs have not produced the desired results and there is uncertainty as to what to do next. In marketing, whereas a new facilitating institution (DEXIA) has just been created in Dominica, Grenada and St. Vincent appear to be uncertain as to what changes to make in their respective marketing institutions. St. Lucia has decided to opt for a new model with the private sector playing a more active role. Although the operational aspects of this new model have yet to be defined, there are indications that the physical infrastructure may be taken over by a federation of farmers organizations. It should be noted that, in general, there is a feeling within the Sub-region that the Marketing Board concept is not an effective model for improving domestic marketing or exports of perishables.

In the areas of ~~agricultural credit, cooperation and transfer of technology and small farmer development~~, it can be said that the policies are, either not well defined or, if so, they are not producing the desired results. Financial resources are available in the banks but are not being used by small farmers, indicating weakness in the methods of channeling credit. Considerable resources are earmarked for research and extension but priority problems are not being overcome. Small farmers are considered priority clients of the Governments, but insufficient efforts are being made to strengthen farmers organizations.

Table A-9 indicates the more relevant agricultural development projects (agreements) managed by the MOA in each of the Islands which, directly or in-directly, have some impact on tree crop production. Six past project experiences are included as their analysis will provide relevant insights as to methods/strategies, etc. which do or do not work and why. Too often "new projects" are initiated without proper analysis of past successes or failures.

At the present time there are at least ~~two projects underway in the~~ ~~region~~ which will have a direct or indirect impact upon fruit tree production and/or marketing. In some cases these actions deal with pre-production (planning, training, research, nurseries) and in others with production, postharvest handling or marketing. Whichever the case, they represent a ~~substantial investment in the region which should have been made~~ ~~in the development of future development activities~~. The failure to do so could well lead to a misallocation of resources, inter-institutional competition, duplication of activities and may retard, rather than advance, fruit production/marketing in the Sub-region. ~~The projects in pipeline which may impact upon fruit production are also identified in Table A-9.~~

Given the present interest and involvement of the multiple donor, regional and international agencies in the development of the fruit sub-sector in the Windward Islands, an integrated effort should be orchestrated, including, at the minimum, the following organizations: EDD, CARDI, CATCO, CDB, CIDA, FAO, HIAMP, IFAD, IICA, TDR, USAID and APHIS.

1.2.2 Regional

There are a number of regional organizations involved with the development of the agricultural sector in the English speaking Caribbean. Those at the macro level are CARICOM and the OECS. CARICOM is the central Secretariat of the Caribbean Community and is located in Guyana. Its highest organs are the Conference of Heads of Government, the primary responsibility of which is to determine the policy of the Community, and the Common Market Council. One of the many institutions of the Community is the Standing Committee of Ministers responsible for Agriculture (SCMA) which has responsibility of the affairs of the agricultural sector.

The Organization of Eastern Caribbean States (OECS) was established in 1981 as the successor organization of the West Indies (Associated States) Council of Ministers and Eastern Caribbean Common Market. The main purposes of the OECS are to promote cooperation, unity, solidarity and economic integration among its Member States.

Between OECS and CARICOM, there is a firm base upon which policies and agreements in regard to joint production/marketing strategies can be developed.

UWI, CARDI, CARDATS and CFC (Table A-10) are four regional institutions that can play a significant role in the development of integrated production/marketing systems in the Windward Islands. The first three agencies are concerned with the generation and transfer of technology.

UWI's main outreach effort is through CAEP, a joint UWI/MUCIA/USAID initiative aimed at increasing extension capability in the Eastern Caribbean. Both CARDI and CARDATS have significant activities in relation to research and extension in each territory, however, very little work is done with tree crops. CFC, on the other hand, is primarily concerned with providing financing and technical cooperation for the implementation of viable projects in the agricultural sector. CATCO is a subsidiary of this latter institution.

Two regional organizations actively involved in fruit marketing from the sub-region are WINBAN and CATCO. WINBAN was formed in 1958 and has become the central coordinating body for the four banana growers associations located in each of the Windward Islands. In addition to its marketing function, which entails the negotiation of price, incentives and quotas and monitoring/forecasting, WINBAN carries out research in banana production and marketing and provides a consultative/coordinating role to the banana industry in the tendering of input supplies, attracting resources and miscellaneous problem solving. WINBAN serves as an integrating force within the sub-region and is considered a viable model to be followed, with modifications, for other commodities or groups of commodities.

CATCO is the marketing subsidiary of the Caribbean Food Corporation (CFC). It is basically a regional trading company attempting to establish the Caribbean as a reliable supplier of fresh produce to extra-regional markets. It is developing a system of contract suppliers, establishing a common Caribbean label, obtaining guaranteed prices for regional produce and negotiating concessional air freight rates, particularly to the UK, Holland and Canada.

1.2.3 International

There are at least 56 donor and/or international organizations (Tables A-10, A-11) supporting development activities in one or more of the Windward Islands. These organizations can be grouped according to the type of assistance they offer and/or their developmental philosophy. Among the group that provides mainly financial assistance through loans or grants, are EDF, CDB, EEC and IDA. Within another group, providing both financial and technical assistance, CIDA, USAID and IFAD can be identified. A third group, which provides mainly technical assistance and small amounts of financing, includes EDD, FAO, IICA, TDRI and OAS. Country missions from France and Taiwan provide technical assistance dedicated to overcome specific production/marketing constraints. A few groups (Peace Corps & IVS) provide human resources to strengthen public and private sector institutions and a wide variety of organizations (OXFAM, HIVOS, ACDI, CUSO, etc.) concentrate their limited resources to assist private sector developmental groups, small businesses and farmer organizations.

Among the international organizations providing financial and/or technical assistance, there tends to be some specialization. For example, CIDA concentrates in natural resource development and fisheries; OAS in natural resource development, land reform, agro-processing and miscellaneous others; FAO in planning, natural resource development, marketing, postharvest and plant and animal quarantine services; IICA

in crop protection, marketing, project formulation, fruit production, etc. Although there is some attempt at specialization by development agencies, there continues to be considerable overlapping and some duplication as a result of poor inter-institutional communication and coordination. Given the large number of donor agencies active in the Sub-region, with better planning and co-ordination, and the decision to work towards common goals, existing human and financial resources could go a long way towards reaching government goals of economic diversification through import substitution and export development.

On the other hand, if on-going and in-pipeline projects continue ~~with-
out~~ ~~adequate~~ ~~integration~~ ~~and~~ ~~governmental~~ ~~supervision~~, more harm than good could result, e.g. subsidized credit to large farmers could provide unfair competition to small farmers, or these could be stimulated to grow tree crops without adequate market outlets.

~~Donor agency project objectives must be kept in line with Government objectives.~~

1.3 Organizational Structure

1.3.1 Private sector

Tables A-12 through A-14 summarize information on institutions of the private sector that are relevant to development of the agricultural sector. In the first instance (Table A-12), data are presented on farmers organizations in the four Islands. These are grouped into traditional organizations (banana, cocoa, spices, etc.) and the non-traditional (small farmers producing non-traditional export crops and food crops). In the first group, the organizations are few in number, have large memberships and have been in existence for at least 28 years. In the case of the non-traditionals, there are many more in number but their memberships are much smaller and they are of recent origin. Whereas the traditional organizations export large volumes of produce (mainly bananas), the non-traditional groups are just beginning to develop export activities.

In terms of basic infrastructure for marketing fruits, the Inland Buying Depots (IBD) of the Banana Growers Associations are the main available resource. Only in St. Lucia is there any chill or freezer space owned by farmers organizations (STAFSCOOP) and that is used for eggs, poultry and pork only. In each country there are a number of farmer organizations providing services such as input supplies, information, technical assistance, credit and marketing. Efforts are made by a number of international and regional development organizations to strengthen these services through technical and financial assistance.

The best example of effective farmers organizations in the Sub-region is that of the Banana Growers Associations (Table A-13). Jointly, their total operations exceeded EC\$80 million in 1985. Some 17,500 growers exported 164,000 tonnes of bananas valued at EC\$172.3 million. To accomplish this they spent over EC\$2.0 million on extension and EC\$8.8 million on leaf spot control. EC\$14.8 worth of agricultural inputs were sold to members and EC\$33.8 million worth of cartons and packing mate-

rials were distributed to members. Administrative costs were approximately EC\$4.9 million and over EC\$2 million was contributed to WINBAN for research and administration and operation of the UK office.

Considering the fact that the majority of banana growers are small farmers, while recognizing the special conditions of the banana industry, the Banana Growers Associations and WINBAN offer useful models for developing non-traditional exports, albeit on a much smaller scale, at least, initially.

Although farmers grow a diversity of crops, the traditional farmers organizations are commodity specific. Each of these groups is fully occupied with its respective set of problems, thus it is unlikely that these traditional groups will be able, or interested, in expanding into the exportation of non-traditional commodities, at least in the near future.

To achieve the goal of export development of non-traditional commodities, non-traditional farmers organizations will have to play a more active, and perhaps leading, role. Some of these organizations, particularly ORD in St. Vincent and STAFCOOP in St. Lucia, have been relatively successful in providing services that have resulted in increased economic returns to their members. Their experiences should be documented and transferred, to the degree possible, to other farmers organizations within the region.

Over the past year, two inter-island meetings have been held with the purpose of evaluating the potential for intra-regional joint marketing between existing non-traditional farmers organizations. At both meetings, decisions were taken by the participants to move forward in planning a joint intra-regional marketing project.

It can be concluded that both the desire and the organizational capacity exist to initiate a pilot project among non-traditional farmers organizations for joint intra-regional marketing. This effort, to be successful, will need both governmental and donor agency support.

Other private sector institutions relevant for the organized development of the agricultural Sector are identified in Table A-14. Each of the Islands can boast of from four to six commercial banks and one development bank. Each also has a National Development Foundation and St. Lucia and St. Vincent each have Development Corporations. In addition to the above, each country has "national" organizations oriented towards strengthening farmers organizations in management and providing assistance in the development of basic services in credit, information, marketing and other priority areas. Only Dominica and St. Vincent have Huckster/Trafficker organizations, although the huckster trade plays a significant role in the agricultural trade in all four countries.

It seems as though the institutional structures necessary for development of the agricultural sector and for diversification into non-traditional exports are in place. However, while banks have financial resources available, they are not being readily used by small farmers, who complain of stringent credit conditions. It appears that there is a need for more effective channels of disbursing credit to small farmers.

Some National Development Foundations (Dominica and St. Lucia) seem to be having success in facilitating credit through farmers organizations. These models should be evaluated and expanded where feasible. The Dominica Credit Union League (DCUL) is noted for being one of the most dynamic in the world. This experience could be very useful to the other islands within the Sub-region.

Farm to Market (FTM) of Dominica initiated activities in 1983 and by 1986 was exporting some 600 tonnes of produce to regional markets. This was nearly twice the amount handled by CATCO during the same period. This group (FTM) has shown initiative in developing intra-regional markets and holds some promise for identifying and developing new markets which could benefit small farmers throughout the Sub-region.

The Association for Caribbean Transformation Ltd. (ACT), although based in Trinidad, originated its activities in Dominica. It is a non-profit service entity which works through farmers organizations, providing market intelligence and analysis for decision making. Its service has expanded to include Trinidad and Antigua.

The Agency for Rural Transformation (ART) is a non-profit development agency based in Grenada. ART works with and through community based groups and projects in benefit of agricultural workers, women, youth, farmers and producers of handicraft. It serves as a channel for resources from donor agencies for rural development.

The Dominica Hucksters Association (DHA) and the Trafficker Small Business Association (TSBA), in St. Vincent, were both organized in 1982. These two organizations were established to improve the proper handling of produce, to improve and/or supply basic services, secure financial and technical assistance and to coordinate and mediate problems affecting these exporters.

What is clearly evident is that the private sector has accumulated a tremendous amount of valuable experience which should be taken advantage of.

If some way can be found to improve coordination, exchange experiences and provide motivation towards common goals, these private sector initiatives can play important roles in diversification and intra-regional marketing.

1.3.2 Public sector Institutions and Services

1.3.2.1 Institutions

Two key institutions in the public sector, for achieving governmental goals of import substitution and export development, are the Ministries of Agriculture (MOA) and the Marketing Corporations (Boards). Tables A-15 through A-18 present some baseline information on personnel, operations and services offered by these institutions. An evaluation of these data will permit a macro-look at the capabilities of these institutions for achieving their desired goals.

As indicated in Table A-15, the number of established technical positions of the MDA varies from 46 in St. Vincent to 187 in Grenada. However, the actual number of staff in place varies from 47 to 168. Vacancies, in terms of established positions, are highest in St. Lucia where 31% are vacant.

Twenty-one staff members are financed by special projects in Dominica and five in St. Vincent. In St. Lucia, 16 staff members are seconded to other projects. In general, all MDA are in agreement that they are understaffed. This is the case even in Grenada, which has a larger staff than the other three islands. In this particular case there is a relatively high percentage of young and under trained technical staff.

In analyzing the distribution of the MDA technical staff (Table A-16), between 24% and 44% of the respective totals can be seen to work in extension. Adding the technical staff working in veterinary services and livestock development, the total percentages of staff working in these three areas are 37% for Grenada, 52% for St. Lucia, 64% in St. Vincent and 75% in Dominica.

Another area where all four countries show a concentrated effort is that of crop (plant) protection. However, in the area of research, relatively few technical staff are employed.

In the case of marketing corporations, Table A-17 shows the value of sales of the respective marketing institutions in 1985. These range from zero in Dominica to EC\$18 million in St. Vincent. In 1986, DEXIA was established in Dominica to provide facilitating services. In St. Lucia the decision has been taken to transfer the marketing board to the private sector. Although the MNIB and the SVGMC continue to operate, governments are considering their modification.

The reason for these changes in the Marketing Board model is due to the fact that, in general, they have proven ineffective in reaching their goals. As can be seen in Table A-17, in all cases where marketing boards operated in 1985, the majority of the returns were earned from imports of non-perishables, although the original purpose of the institutions was to market perishables. Of the four marketing institutions, the only one which shows a profit is the SVGMC. These profits are generated from the imports of rice and sugar and non-perishables sold through its supermarket outlet.

It can be concluded that the present models for marketing institutions are ineffective in promoting diversification and export development of perishable commodities. Although there is undoubtedly a need for marketing services to facilitate the identification and development of export markets, the present institutions are not meeting that challenge. While DEXIA seems to be moving in the right direction, it has yet to identify priority services and develop the proper channels for getting farmers, farmers organizations and exporters more actively involved in an integrated process. In the remaining three countries Government decisions are pending in respect to types of services to offer and the respective roles of the private and public sectors.

1.3.2.2 Services

The last Table in this section (Table A-18) qualifies the basic services offered by the public sector in the areas of information, extension, credit and farm input supplies. In the case of information, all four countries (MOA) have statistical and information units which deal with agricultural information. Only two of these have the information on computer. Although two countries do a good job of information collection, all do poor jobs of information analysis. The poorest quality information is that related to production. In some cases the countries do an "ok" job of collecting market price information and trade statistics.

Although all the MOA have significant numbers of personnel working in extension, only Dominica reports significant exposure of these agents to training and/or practical experience in postharvest handling and/or marketing. While some extension agents have received some training in these areas in Grenada and St. Lucia, very little exposure has occurred in St. Vincent.

In the case of credit, all four countries reported similar situations. Whereas money is available in the commercial and development banks, small farmers tend not to use it as they consider the interest rates to be too high and the collateral requirements much too stringent.

The public sector institutions do provide some services in terms of farm input supplies. Some MOA rent or loan equipment and sell or donate small amounts of chemicals. In all four countries the MOA sells veterinary drugs, seeds and nursery plants. Only in the case of the nursery plants are large volumes marketed. Most chemicals and other farm inputs are marketed through farmers organizations and commercial firms.

Given the above analysis, it appears that the private and public sectors each have comparative advantages in providing certain types of services. ~~Small farmers, through their respective business organizations, have achieved significant success. Public sector institutions, on the other hand, are providing a rather wide range of relatively inefficient services.~~ Since they presently have very limited resources, and since this is unlikely to change in the foreseeable future, these public sector institutions should concentrate their scarce resources in those areas where costs or risks are too high for farmers of ~~small organizations~~. By concentrating resources in specific priority areas, and giving attention to efficiency, public sector institutions could become much more effective in their operations at little or no increase in costs.

Table A-1: Demand of Selected Fruits from Selected Extra-Regional Markets and Sub-regional Supply, tonnes

Fruits	Tonnes Imported			EXTRA-REGIONAL EXPORTS
	EEC (1)	USA (2)	Canada (3)	from SUB-REGION (1985)
Mango	17,160 (4)	45,000	n.a.	522
Avocado	86,698	7,000	n.a.	39
Grapefruit	380,152	2,000	72,122	577
Orange:				5
-navels/other sweet	1,738,020	25,000	272,776	
-tangerines/mandarins	783,304	13,000		
-others	33,084	1,000		
Lime	4,000 (5)	26,000	22,380 (6)	5
Breadfruit	1,500 (5)	n.a.	n.a.	954
Plantain	n.a.	106,000	n.a.	296
Soursop	n.a.	n.a.	n.a.	42
Golden & star apples	n.a.	n.a.	n.a.	15
Papaya	n.a.	1,000	n.a.	0
Other fruits	n.a.	n.a.	34,215 (7)	28
Total	-	-	-	2,483

(1) Imports for 1985. Includes EEC trade; data obtained from Tropical Development Research Institute, London.

(2) Imports for 1986. Source: US Agricultural Imports, Jan.-Dec., 1986, USDA, Foreign Agricultural Service, Washington, USA.

(3) Imports for 1984. Source: Imports by Commodities, December, 1984, Statistics Canada.

(4) Includes guava and mangosteen.

(5) Estimates.

(6) Lemon imports.

(7) Includes mangoes, avocados, breadfruit and others.

Table A-2: Recommended Production Environment for Selected Fruit Crops

CROP	TEMP. FOR BEST QUALITY		WATER REQUIREMENTS		WIND		pH	SOIL		
	min.	max.	Average tree/day liters	mm per year and special conditions	Tolerance max. speed km/hour	Common damage		Best type	Main constraints	Adaptability to different soil types
Mangoes	25	31	210	1000-1200 mm well distributed. Require dry season of 4-6 mth Best colour in dry areas (< 600mm/year) with complementary irrigation.	< 40	-Defoliation -Fruit/flower drop -Breaking of twigs -Recuperation: very good	Almost any	5.5-7.5	- Water logging - salt	Very wide
Avocados (W. Indian & hybrids)	25	31	160	1000-1200 mm well distributed	< 25	-Heavy defoliation -Fruit/flower drop -Snapping of branches & limbs -Recuperation: poor	Deep, Light to medium texture very good drainage	6-8	- Water logging - Salt - Aeration (rootrot)	Narrow
Canhew	5	31	85	400-1500 mm well distributed but with dry season	< 40	-same as mangoes	Deep, well drained Light texture	5-7.5	-Water logging -Salt	Wide
Oranges	15	30	175	1000-1500 mm well distributed but with short dry season (3 mths) Requires cool temp. for best internal and external colour	< 30	-Defoliation -Fruit/flower drop -Snapping of twigs -Splitting of branches and limbs -Recuperation: fair	Deep sandy loam Good drainage	5.5-6.5	- Water logging - Salt	Moderate
Grapefruit	20	30	250	1000-2000 mm well distributed but with short dry season (2-3 mths)	< 30	Same as above	Deep well drained sandy loam	5.5-7.5	- Water logging - Salt	Moderate
Limes	20	30	120	1000-1500 mm well distributed but with short dry season (2-3 mths)	< 30	Same as above	Deep well drained loamy	5-6.5	- Water logging - Salt	Wide

Continuation of Table A-2

CROP	TEMP. FOR BEST QUALITY		WATER REQUIREMENTS		WIND		pH	SOIL Main constraints	Adaptability to different soil types
	min.	max.	Average tree/day litres	mm per year and special conditions	Tolerance max. speed (km/hour)	Common damage			
Breadfruit	25	35	350	1500-2500 mm	< 30	-Defoliation -Fruit flower drop -Breaking of branches & limbs -Splitting of branches -Recuperation: good	Deep well drained loamy soil	6-8 -Shallow soils -Water logging -Salt	Moderate
Plantain	25	30	30	1500-2500 mm/year well distributed	< 10	-Shredding of leaves -Snapping -Toppling	Deep well drained loamy soils	5.5-7.5 -Water logging -Shallow soils	Moderate
Sour sop	10	35	145	1000-2000mm well distributed	< 30	-Flower abortion & drop -Splitting &/or breaking of branches -Recuperation: fair	Deep well drained loamy	5.5-6.5 -Water logging -Salt	Wide
Carambola	5	30	145	1000-2000mm well distributed	< 30	-Defoliation -Fruit/flower drop -Breaking & splitting of branches -Recuperation: fair	Deep well drained	5-6.5 -Water logging -Salt	Wide
Passion fruit	15	30	15	1000-1500mm alternate wet & dry seasons	< 25	-Defoliation -Fruit/flower drop and/or abortion -"Bending" trellises -Recuperation: poor	Deep well drained	6-6.5 -Water logging -Salt	Wide

Continuation of Table A-2

CROP	TEMP. FOR BEST QUALITY		WATER REQUIREMENTS		WIND			SOIL		
	min.	max.	Average tree/day litres	mm per year and special conditions	Tolerance max. speed (km/hour)	Common damage	Best type	pH	Main constraints to different soil types	
Papaya	15	30	15	1000-1500mm well distributed	< 10	-Flower/fruit drop -Fruit scars -Burning of leaves -Snapping -Toppling -Recuperation: poor	Deep rich light well drained	6-8	-Water logging -Salt -Shallow soils	Moderate
Guava	5	35	75	1000-1500mm well distributed It can stand 4-6 dry months	< 30	-Flower/fruit drop -Fruit scars -Breaking & splitting of branches -Recuperation: very good	Deep rich well drained soils. Can withstand waterlogging for short periods	5-7.5	-Flooding for long periods -Salt	Very wide

Source: Compiled by Rafael Marte from experience and diverse publications

**Table A-3: Principal Indicators of the Environment in the Windward Islands
by Environmental Factors and Country**

Environmental factors	Dominica	Grenada	St. Lucia	St. Vincent
Mean annual temp. range (C)	21-27	23-29	21-29	24-31
Mean annual temp. (C)	25	25	25	27
Relative humidity (%)	70-90	75-80	60-90	70-75
Rainfall range (mm)	2500-7500	1000-4100	1000-4000	1500-3750
Mean annual rainfall (mm)	3590	2157	1750	2137
Driest months	Feb.-May	Feb.-May	Feb.-April	Jan.-April
Wettest months	July-Oct.	July-Oct.	July-Oct.	July-Oct.
Highest point (m)	1390	835	950	1234
Soil origin	volcanic	volcanic	volcanic	volcanic

Winds: Wind conditions are similar in the four Islands. During the dry months the winds are moderate to strong. During the wet months they are moderate but with strong gusts, sometimes of hurricane strength. Periodic wind storms will do considerable damage to specific countries or geographical regions within one country. Due to the closeness of the islands, the same hurricane may cause damage to all or several of the islands.

Source: IICA/NOA Country Baseline Information documents.
(1) Exact information unavailable for number of hurricanes

Table A-4: Percentage of Total Land Area by Slope and Country

Slope of land	Dominica (1)	Grenada (2)	St. Lucia (3)	St. Vincent (4)
0 to 5	2	5	23	n.a.
6 to 10	>	5	10	n.a.
11 to 20	>13	19	25	n.a.
21 to 30	>	48	30	n.a.
> 30	>85	20	12	n.a.
Total %	100	100	100	100

Source: IICA/MOA Country Baseline Information documents.

- (1) S. McConaghy, Problems of Land Use Development in the West Indies, Proceedings, International Seminar on Agricultural Engineering, UWI, 1970.
- (2) Vernon, K.C. et. al., Soil and Land-Use Surveys, No. 9 Grenada, ICTA, Trinidad June, 1959. 41 pages. Based on 73375 acres on main island.
- (3) OAS/MOA, St. Lucia, 1981
- (4) ICTA, Trinidad/Tobago, 1958

Table A-5: Percentage of Total Land Area in Categories of Land Use by Country

Recommended land use	Dominica (1)	Grenada (2)	St. Lucia (3)	St. Vincent (4)
Cultivable lands:		24.9	9.7	27.7
-without limitations	>	- 2.3	- 2.0	- 3.5
-moderate limitations	>	- 2.3	- 2.2	-20.7
-strong limitations	> 49	-20.3	- 4.7	- 3.5
Pasture/free crops	>	25.7	16.4	51.7
Permanent tree crops	9	24.3	67.1	10.3
Natural forest/non.ag.	42	24.3	6.8	10.3
Total	100	100	100	100

Source: IICA/MOA Country Baseline Information documents.

- (1) Dominica National Structure Plan, 1976 and calculations by researchers.
- (2) Vernon, K.C., ICTA, Trinidad/Tobago, 1959
Based on 74000 acres on main island.
- (3) OAS/MOA, St. Lucia, 1981
Note: Methodology of classification used in St. Lucia was different from that used in other islands.
- (4) ICTA, Trinidad/Tobago, 1958

Table A-6: Some Characteristics of Land in the Windward Islands by Country

Characteristics	Dominica	Grenada	St. Lucia	St. Vincent
Total land area (acres)	187796	85084	152248	95836
Land held in farms (acres)	71363	34243	64228	29694
% total land in farms	38	40	42	31
Average farm size (acres)	9.0	4.2	5.2	4.4
No. State controlled estates	7 (1)	24 (2)	2 (3)	7 (4)
Estate lands controlled by State (acres)				
- total	5310 (1)	3701 (2)	4400 (3)	8968 (4)
- cultivable	3727	1764	n.a.	n.a.

Source: Official statistics, Census reports and IICA/MOA Country Baseline Information documents.

- (1) Estates: Melville Hall (800), Newfoundland (560), Pointe Mulate (272), Soufriere (627), Geneva (1423), Castle Bruce (1628), Morne Plaisance (logging).
- (2) Estates: Black Bay (130), Carriere (71), La Sagesse (118), Laura (98), Levera (119), Loretto (49), Marlmount (120), Paradise (198), Perserverance (325), Poyntzfield (43), Requin (102), Belle Vue, St. G. (57), Bocage (350), Bon Accord (140), Diamond (136), Grand Bras (184), La Force (150), Mount Morne (31), Pecher (66), Samairtan (37), Belle Vue, St. A. (220), Montrevil (159), Springs (208), St. Omer (90), Mt. Hartman (400) and Mirabeau (100).
- (3) Estates: Model Farms (1600) and Dennery Farm Company (2800).
- (4) Estates: Richmond Vale (2600), Wallilabou (1300), Lauders (650), Langley Park (200), Colonaire (350), San Souci (150), Diamond (218) and Orange Hill (3500).

Table A-7: Some Characteristics of Farms in the Windward Islands by Country

Characteristics	Dominica	Grenada	St. Lucia	St. Vincent
Total land farm holdings (acres)	71363	34243	64228 (1)	29649
Total # farms	7922	8202	12398 (1)	6799
Average farm size (acres) (2)	9.0	4.2	5.2 (1)	4.4
Average # parcels/farm (3)	3	2.1	1.15(4)	1.4
% farms <1 acre	28	49	45 (4)	43
% land area	1	6	2 (4)	4
% farms <5 acre	47	88	82 (4)	89
% land area	11	31	14 (4)	26
Ownership (% farms)				
- owned (5)	76 (6)	66	93 (4)	70
- share tenancy	-	2	1 (4)	4
- rented	16 (5)	12	3 (4)	12
- mixed tenure	7 (5)	15	3 (4)	7
- rent free	1 (5)	0	0	3
- other	-	5	0	4
Number of crops normally grown in crop mix	4-8	6-8	2-7	4-7
Principal crops	bananas coconuts citrus	nutmeg cocoa bananas	bananas coconuts	bananas coconuts rootcrops

continuation of Table A-7

Characteristics	Dominica	Grenada	St. Lucia	St. Vincent
Average # trees per fruit farm: (7)				
- mango	n.a.	15	54	n.a.
- avocado	n.a.	6	22	n.a.
- orange	>	13	34	n.a.
- grapefruit	> 179	12	34	n.a.
- lime	>	31 (8)	10	n.a.
- other citrus	>	n.a.	3	n.a.
- breadfruit	n.a.	16 (8)	19	n.a.
- plantains	n.a.	n.a.	97	n.a.
- coconuts	n.a.	n.a.	342	n.a.
- soursop	n.a.	4	n.a.	n.a.
- sugarapples	n.a.	3	n.a.	n.a.
- goldenapple	n.a.	1	n.a.	n.a.
- sapodilla	n.a.	2	n.a.	n.a.

Source: Census data: Dominica (1976/77); Grenada (1981); St. Lucia (1974 & 1986); St. Vincent (1972/73 & 1986). Another source in St. Lucia was the Fruit Tree Crop Survey in St. Lucia (IICA/BDD/MOA) January, 1987.

- (1) 1986 census data
- (2) Multi-parcel farms are common, inclusion of "holdings without land" would reduce these averages even further.
- (3) Source: census and survey data.
- (4) 1974 census data
- (5) Frequently includes family owned land.
- (6) Source: Dominica National Structure Plan 1976-1990
- (7) Dominica from MOA citrus survey; Grenada from IICA national fruit tree survey; St. Lucia from IICA survey of 179 tree crop farmers. In the case of St. Lucia the average # trees is that on farms growing relatively larger amounts of fruit trees. The national average is lower still.
- (8) Averages determined from IICA survey of producers specializing in production of respective commodity.

Table A-8: Agricultural Developmental Policies by Country

Policy Areas	Dominica	Grenada	St. Lucia	St. Vincent
Land Reform	-Redistribute estate lands to small farmers with minimum services	-Privatization of state farms into viable family farm units	-Provide family plots of land by division of large plantations	-Redistribution of estate land, providing minimum infrastructure requirements
Import substitution	-Control of selected imports -Subsidies to stimulate local production & processing	-Control imports within CARICOM context -Stimulate production/diversification/mktg. to generate quality products & increase local consumption	-Control selected imports -Improve use of resources to achieve optimum level of self-sufficiency and higher nutritional levels of consumption	-Stimulate production via controls on selected imports -Import duty concessions on farm input imports
Export development	-Stimulate production via subsidies on research & development -Provide facilitating services	-Strengthen institutional capabilities & facilities -Develop external mktg links -Stimulate interest of private sector -Obtain fruit fly free status	-Increase productivity of bananas -Diversification into non-banana tree crops -Stimulate private sector exports	-Tax concessions on selected exports -Obtain fruit fly free status -Subsidize research and development activities for non-traditional products
Generation & transfer of technology	-Somewhat unclear -Tendency to rely on regional/international direction	-Reliance on regional/intnl projects to generate/transfer technology -Develop national capability through counterparting	-Unclear at this point -Have relied on regional efforts in the generation & transfer of technology	-Reliance on regional and international projects to identify, generate & transfer technologies
Development of small farmers	-Development of farmers organizations -Promotion of integrated rural development	-Transition from plantation system to small farms -Subsidization of land & services -Organize system of land settlement thru Model Farms	-Strengthening of traditional and non-traditional farmers organizations -Subsidization of research & development in production & marketing	-Lease of land to small farmers with option to buy
Agricultural credit	-National credit policy is unclear, present policies basically determined by conditions of CDB & IFAD loans & commercial banks	-Present policies basically determined by conditions of CDB -Government seeking to get CDB to relax loan policies	-National credit policy determined by St. Lucian Development Bank -IFAD loan is let at 12%	-Same as Dominica
Agro-processing	-Promotion, support & sharing of local ventures -Research & development through Product Chemist Laboratory	-Research and development activities through PCL -Promotion & concessions to private sector to stimulate agro-industry as way of increasing demand	-Policy in this area remains undefined -PCL activities minimal	-No clear policy in this area -PCL remains closed

continuation of Table A-8

Policy Areas	Dominica	Grenada	St. Lucia	St. Vincent
Marketing	<ul style="list-style-type: none"> -DEXIA established in 1986 to provide facilitating services -Clear policy on leaving hands-on marketing to private sector 	<ul style="list-style-type: none"> -While government wants to protect farmers and promote private sector exports no clear policy has been defined -MNIB continues to import export and to retail 	<ul style="list-style-type: none"> -Although government has made decision to close SLMB, no clear decision has been made as to what type model will replace it 	<ul style="list-style-type: none"> -SVMC continues to import, export and retail, however, future is unclear. Thinking seems to be against direct involvement and more towards provision of facilitating services
Natural resource management	<ul style="list-style-type: none"> -Strong orientation to protect environment -Soil conservation in priority watershed areas 	<ul style="list-style-type: none"> -Zoning of watershed areas & soil/water conservation & management by area 	<ul style="list-style-type: none"> -Development of models for proper use of individual farms -Pilot projects for proper management of whole catchment basins 	<ul style="list-style-type: none"> -Effective management of natural resources -Pilot projects for proper management of specific watershed areas

Source: Official speeches, documents, interviews with MOA personnel, 1987. In most cases the policies are not clearly stated in official documents.

Table A-9: Past Project Experiences, On-going Projects, and Projects In-pipe-line Relevant to the Production and Marketing of Fruit in the Windward Islands, by Country, March, 1987

Names of Projects by Category	Countries Where Active				Funding Agency
	Dominica	Grenada	St. Lucia	St. Vincent	
PAST PROJECT EXPERIENCES:					
1. Tree Crop Diversification Project	X				BDD
2. Line Rehabilitation	X				BDD
3. Floriculture Development Project	X				KOF
4. Orchard Crop Diversification Project			X		BDD
5. Agricultural Development Project:					
- Winter Vegetable Pilot Project				X	USAID
- ORD revolving loan scheme				X	USAID
6. Numerous marketing studies	X	X	X	X	BDD, [redacted], FAO CDB, USAID, etc.
ON-GOING PROJECTS:					
1. Tropical Tree Crops and Spices	X				BDD
2. Orchard Pest Management	X				BDD
3. Agricultural Export Marketing	X				BDD
4. Coconut Rehabilitation & Expansion	X				CIDA
5. Essential Oils Programme (and Spices)	X				KOF
6. Integrated Rural Development	X				OAS, IPAD
7. Agriculture Training Centre	X				PAC (French)
8. Integrated Research & Micro Project	X				PAC (French)
9. Plant Propagation & Distribution	X				MOA
10. Land Development & Settlement	X				MOA
11. Plant Propagation Component (Structural Adjustment Project)			X		USAID
12. St. Lucia Small Farmers Agricultural Development Project (SPAD)			X		CDB, IPAD
13. Fruit Tree Rehabilitation			X		
14. Natural Resources Management				X	OAS
15. Top Working Mango Phase II				X	BDD
16. Fruit Fly Survey and Trapping		X		X	USAID/APHIS [redacted]
17. Cocoa Rehabilitation Project		X			CIDA
18. Agricultural Rehabilitation and Crop Diversification Project		X			IDA/CDB Govt/USAID
19. Model Farms		X			[redacted]
20. Crop Protection Project	X	X	X		[redacted]
21. Reduction of Postharvest Losses of Fruit & Vegetables entering Inter-Island Trade	X	X	X	X	FAO
22. Caribbean Agricultural Extension Project	X	X	X	X	USAID/UWI/MUCIA
23. Comprehensive Study Production/Marketing Constraints to Joint Marketing	X	X	X	X	[redacted], CDB
24. High Impact Agricultural Marketing & Production Project (HIAMP)	X	X	X	X	USAID
- Tropical Fruit Sub-Project	X	X	X	X	USAID
25. Caribbean Agricultural Trading Company Ltd.	X	X	X	X	CFC, USAID
26. Strengthening Farmers Organizations	X	X	X		[redacted]
27. Strengthening Technology Generation & Transfer			X		[redacted]
28. Pawpaw Research/Production Project			X		[redacted]

Continuation of Table A-9

Names of Projects by Category	Countries Where Active				Supporting Agency
	Dominica	Grenada	St. Lucia	St. Vincent	
PROJECTS IN-PIPELINE:					
1. Improvement in Information	X				ACCT (France)
2. Preparation of Forest Inventory	X				FAO
3. Agricultural Planning Policies & Programmes				X	FAO
4. Up-grading of Plant Quarantine and Supporting Facilities			X		FAO
5. Pawpaw Production	X	X	X		FAO
6. Wharf facilities improvement				X	USAID
7. Publication of Sub-regional newspaper: Focus on Rural Development	X	X	X	X	CUC
8. Training of personnel in postharvest handling and project formulation	X	X	X	X	FAO, USAID, FAO
9. CARICOM Production and Market Information System	X	X	X	X	CIDA, CARICOM
10. Strengthening marketing capacity of STAPCO-OP			X		CUC, FAO
11. Development of the Caribbean mango industry: A regional project research proposal	X	X	X	X	CSC

Source: IICA research

Table A-10: Actions of Donor & International Agencies in Policy Areas by Country

Policy Areas	Dominica	Grenada	St. Lucia	St. Vincent
Land Reform	FAO, IFAD	USAID, OAS FAO	Geest, CDC, EDF, USAID	CDB, CIDA, REC, BDD, OAS,
Import substitution	IICA, FAO, IFAD French, CARDI, CARDATS, CAEP	IDA (World Bank) CARDATS, CARDI, IICA, French, HIVOS	CARDI, French, CARDATS	FAO, USAID
Export development	BDD, HIAMP, EDF, CARDI, Geest	USAID, CIDA, EDF, CARDATS, CARDI, IICA, USDA, Geest	BDD, IFAD, IICA, FAO, CDB HIAMP, Geest	USAID, USDA, FAO, HIAMP, Geest
Generation & transfer of technology	IICA, FAO, BDD, CIDA, IFAD, French, CARDI, CARDATS, CAEP Chinese, UWI CYMMIT, CIP	CARDI, CARDATS, CAEP, IICA, French, UWI, Peace Corps	CAEP, CARDI, OAS, FAO, IICA, USAID, CIDA, Chinese, UWI CARDATS, PC, French	CARDI, CARDATS Chinese, CAEP, French, UWI, PC
Development of small farmers	IICA, IFAD, French, CAEP CARDATS, HIVOS, ICRI, CDB, PC OXFAM, BDD, IAF, WINBAN, USAID, CARDI, CIDA, EDF, TDRI, REC, CDF, INRA, IPRA, ACT,	CARDATS, IICA, CARDI, USAID, CAEP, French, FAO, HIVOS, BDD, OAS, GRES, EDF, CDB, OXFAM, WOW, ICRI, ACDI, CUSO, Geest, WINBAN, CARICOM, PC	CDB, IFAD, IICA, French, CARDI, CUC, CUSO, BDD, IVS, USAID, WINBAN, CAPRICAN, POA, CBSO, FIT, PC CIDA	French, CAEP, CARDATS, USAID, PADP, ACDI, PPI, WINBAN, CARICOM WOW, CPWD, WAND, PC, CIDA, USDA, IAF, CARDI, CCC, HIVOS, OXFAM, IVS, Rockefeller, DCFRN
Agricultural credit	HIAMP, French IFAD, CARDATS CDB	CDB, French, HIAMP	CDB, IFAD, HIAMP	CDB, HIAMP
Agro-processing	FAO, HIAMP, IFAD French, CARDI, EDF, CAEP	FAO, BIB UNDP HIAMP	OAS,	OAS, HIAMP
Marketing	BDD, IICA, FAO HIAMP, FRENCH, IFAD, CARDATS, CAEP, CARICOM CATCO	IDA, IICA, USAID, FAO, HIVOS	FAO, IICA, CPTC, CATCO	FAO, USAID, CATCO
Natural resource management	FAO, FRENCH, CARDI, OAS	OAS, BDD, USAID, PC	EDF, OAS, CIDA	CIDA, OAS

Source: IICA, based on official speeches, documents and interviews with agricultural sector decision makers, 1987

Table A-11: Countries of the Sub-Region where Donor & International Agencies are Active

Donor Agency	Dominica	Grenada	St. Lucia	St. Vincent	Donor Agency	Dominica	Grenada	St. Lucia	St. Vincent
ACDI	X			X	PADP				X
ACT	X				PC	X	X	X	X
BDD	X	X	X	X	POA			X	
CAEP	X	X	X	X	PPI				X
CAPRICAN			X		Rockefeller				X
CARDATS	X	X	X	X	TDRI	X			
CARDI	X	X	X	X	UNDP		X		
CATCO	X		X	X	USAID	X	X	X	X
CCC				X	USDA/APHIS		X	X	X
CCGND					UWI	X	X	X	X
CDB	X	X	X	X	WAND				X
CDC			X		WINBAN	X	X	X	X
CDP	X				WOW		X		
CRSO			X						
CPTC			X		Total	33	25	32	32
CPWD				X					
Chinese	X		X	X	Total number agencies: 56				
CIDA	X		X	X					
CIP	X								
CUC			X						
CUSO		X	X						
CYMHIT	X								
DCPRN				X					
EDP	X	X	X						
EBC	X			X					
EIB		X							
FAO	X	X	X	X					
French	X	X	X	X					
FIT			X						
Geest	X	X	X	X					
HIAMP	X	X	X	X					
HIVOS	X	X		X					
IAP	X			X					
ICRI		X							
IDA		X							
IPAD	X		X						
IPRA	X								
IICA	X	X	X						
INRA	X								
IVS			X	X					
OAS	X	X	X	X					
OXFAM	X	X		X					

Source: IICA research and Table A-10

Table A-12: Number and Membership of Farmers Organizations and Type of Infrastructure and Services Offered by them by Country 1986

Characteristics	Dominica	Grenada	St. Lucia	St. Vincent
Farmer organizations:				
(1) Traditional				
- # organizations	4	4	3	2
- # members	5831	18577(2)	10800(3)	4824
- ave. # years in existence	35	28	40	45
(4) Non-Traditional				
- # organizations	53	6	9	7
- # members	1058	1119	337	2992
- ave. # years in existence	6	5	4	6
Tonnes ag. produce exported (1985)				
- traditional	>34000	>13000	>82000	>41000
- nontraditional	574(5)		<100	<200
Type				
Infrastructure: (6)				
- banana IBD's (#)	13	6	13	15
- chill room (cf)	0	0	(7)	0
- freezers (cf)	0	0	(7)	0
# organizations offering following services				
- input supply	3	4	7	6
- information	6	1	6	3
- training	6	2	6	6
- technical assistance	4	3	4	3
- credit	5	1	3	5
- marketing	4	5	5	2
Regional/international organizations supporting development of farmers organizations	CDB, CDF, ACT, CYMHIT, ICRI, IAF, NIVOS, OXPAN, BDD, IPAD, WINBAN, EDP, PC, EEC, CIDA, French, USAID, TDRI, CARP, CARDI, IICA, INRA, IPRA	ACDI, CDB, GERES, EDP, OXPAN, French, NIVOS, WOW, ICRI, USAID, GREST, CUSO, WINBAN, CARDI, CARDATS, CARP, CARICOM,	BDD, CDB, USAID, PIT, French, IICA, WINBAN, CUC, OXPAN, NIVOS, CIDA, CUSO, CARDI, POA, IVS, CESO, CAPRICAN, IPAD, PC	ACDI, IAF, WOW, CARICOM, CCC, WINBAN, DCFRN, OXPAN, NIVOS, PADP, IVS, PPI, CARDI, USAID, PC, Rockefeller, French, WAND, CARP, CIDA, CPWD

Source: IICA Research, 1986. (1) Those organizations handling traditional crops (bananas, cocoa, spices, coconut). (2) There are only 8202 farms in Grenada, thus several farmers belong to more than one farmers organization. (3) Includes 7000 members SLBGA. (4) Those of recent origin, dealing with non-traditional crops. (5) Farm-to-Market. (6) For fresh agricultural produce only. (7) STAPCOOP: two chill rooms (2250 cf) for eggs, one freezer (1620 cf) for meat.

Table A-13: Value of Services Provided by Banana Associations in the Windward Islands by Type of Service and by Association, 1985

Type of Service	Dominica Banana Mktg. Corporation	Grenada Banana Co-op. Society	St. Lucia Banana Growers Asso.	St. Vincent Banana Growers Association
Total Operations in 1985	\$15,869,171	\$4,906,651	\$40,712,320	\$18,505,348
Total # active members 1985	5,021	900	7,000	4,601
Total tonnes exported 1985	33,963	8,007	81,986	40,078
Contribution to WINBAN for Research/admin/UK office	\$483,387	\$126,000	\$933,382	\$526,139
Extension service	\$317,608	\$229,000	\$921,514	\$573,251
Leaf spot control	\$3,264,225	\$931,000	\$3,395,911	\$1,228,322
Sales of inputs	\$5,714,297	\$619,340	\$1,460,944	\$7,027,649
Supplies of cartons & packaging materials	\$7,333,297	\$874,500	\$16,547,416	\$9,074,776
Administrative costs	\$1,473,322	\$618,513	\$1,715,196	\$1,053,904
Indices:				
-Admin costs/total opers.	.09	.13	.04	.06
-Admin. costs/tons exported	\$43.38	\$77.25	\$20.96	\$26.30
-Admin. costs/input sales	0.25	1.0	1.17	0.15
-Admin. costs/cost extension	4.64	2.70	1.86	1.84
-Cost extension/tons exported	9.35	28.60	11.24	14.30

Source: WINBAN and Banana Growers Associations.

Table A-14: Identification of Banks, Development Institutions and National Private Sector Organizations Supporting Farmers Organizations, by Country

Type Organization	Dominica	Grenada	St. Lucia	St. Vincent
Commercial banks:				
- Barclays Bank	X	X	X	X
- Bank of Nova Scotia		X	X	X
- Royal Bank of Canada	X		X	
- Banque Francaise Commerciale	X			
- National Commercial Bank	X	X	X	X
- Cooperative Bank		GCB	SLCB	SVCD
- Caribbean Banking Corp.				X
- Canadian Imperial Bank of Commerce			X	X
- Grenada Bank of Commerce		X		
Development banks:				
- Ag. Ind. Dev. Bank	AIDB			
- Development Corp. of SVG				DEVCO
- Development Bank		GDB	SLDB	
Development Organizations:				
- Nat. Dev. Foundation	NDF	NDF		NDF
- Nat. Res. Dev. Foundation			NRDF	
- Ag. Dev. Corporation				ADC
- Nat. Dev. Corporation			NDC	
National Organizations providing support to farmers organizations in the following areas:				
- Credit	DCUL	GCUL, NDF	NRDF	ORD
- Information services	ACT WINBAN	ART WINBAN	STAPCOOP WINBAN	ORD, PP WINBAN
- Marketing service	PTM WINBAN	WINBAN	STAPCOOP WINBAN	ORD WINBAN
- Technical assistance	SPAT, PTM WINBAN	ART WINBAN	STAPCOOP, NRDF WINBAN	ORD, PP WINBAN
- Production		ART	STAPCOOP	ORD
- Research	WINBAN	WINBAN	WINBAN	WINBAN
- Integration	NPU WINBAN	NPPU WINBAN	STAPCOOP WINBAN	NPU WINBAN
Other Relevant Organizations:				
- Nuckster associations	DNA			
- Traffickers Small Business Association				TSBA

Source: IICA research, 1986

Table A-15: Number of Posts and Vacancies of Technical Staff of the Ministries of Agriculture (excluding forestry & fisheries) in the Windward Islands by Country, number and percent, 1986

Category	Dominica		Grenada		St. Lucia		St. Vincent	
	#	%	#	%	#	%	#	%
1. Established positions(1)	63	84	187	111	175	60	46	98
2. Vacancies(2)	9	14	19	10	54	31	4	9
3. Special project activities	21(3)28(4)		0	-	16(5) -		5(6) 11(4)	
4. Actual staff in place	75(7) -		168	-	105(8) -		47(7) -	

Source: IICA/MOA Baseline Information documents

(1) % of actual staff in place. (2) % of established positions. (3) Staff financed by special projects. (4) % of actual staff in place. (5) Seconded to other projects. (6) Employees with the MOA on probation with funding from the Fruit Fly Survey. (7) Equals 1-2+3. (8) Equals 1-(2+3)

Table A-16: Number and Percent of Actual Staff in Place (excluding forestry and fisheries) Ministry of Agriculture by Division and by Country

Division	Dominica		Grenada		St. Lucia		St. Vincent	
	#	%	#	%	#	%	#	%
Statistics	2	3	5	3	8	8		
Communications	3	4	0	0	4	4	2(1)	4
Extension	33	44	41	24	35	33	20	43
4-H	0	0	7	4	0	-	0	-
Home Economics	0	0	0	0	1	1	3(1)	6
Farm management(ag.sta)					5	5		
Research	0	0	4	2	4	4	2	4
Plant propagation	(2)		13	8	2	2	(2)	
Plant protection	6	8	12	7	7	7	7(3)	15
Conservation	0	0	13	8	5	5	0	-
Water resource/irrig.					4	4		
Land use	0	0	10	6	-	-	0	-
Land and surveys	2	3	18	11	-	-	1(4)	2
Livestock	14	19	6	4	8	8	1	2
Veterinary services	9	12	15	9	12	11	9(1)	19
Farm machinery	0	0	7	4	1	1	0	-
Farm school	0	0	7	4	4	4	0	-
Produce Chemist Lab.	3	4	8	5	3	3	closed	
Technical administra.	3	4	2	1	2	2	2	4
TOTAL	75	100	168	100	105	100	47	100

Source: Official data from the respective MOA's, adjusted to meet the present situation. (1) Plus one Peace Corps Volunteer. (2) Included with extension (3) Includes five financed by Fruit Fly Survey who are on probation. (4) Cumberland Hydro project engineer

Table A-17: Number of Personnel, by Type, and Volume of Operations (1985) of Marketing Boards, by Country

Type Information	Dominica	Grenada	St. Lucia	St. Vincent
Name	DEXIA	MNIB	SLMB	SVGMC
Value Sales (1985)	(1)	EC\$11.9 million	<EC\$1.0 million	EC\$18.0 million
Net Profits (1985) losses in ()	0	(EC\$1.2 million)	losses unknown	EC\$1.8 million
Type of Operations in percent of sales:				
- Import	-	91%	61%	80%
- Export	-	<1	27	1
- Retail	-	9(2)	12	19(3)
Total	-	100%	100%	100%
Monopoly on marketing of following products:				
- rice imports		X		X
- sugar imports		X		X
- milk imports		X		
- ginger exports			X	
Number Employees:				
- Administrative	4	61	12	38
- Technical	4	5	-	1(4)
- Day labourers	13	4(5)	-	144
- Vacancies	0	1	-	0
Total	21	71	12	183

Source: IICA research.

- (1) The Dominica Agricultural Marketing Board was closed and for all practical purposes did not operate in 1985. DEXIA was established in 1986 to provide marketing facilitating services, it does not actually handle produce.
- (2) Mainly fresh produce.
- (3) Mainly imported non-perishable items sold in supermarket.
- (4) One CPFC part-time accountant. Technical positions are held by persons who have obtained their experience on the job.
- (5) Some persons with permanent positions, classified as administrative, undertake functions which are carried out by day labourers in St. Vincent.

Table A-18: Qualification of Selected Facilitating Services Offered by the Public Sector by Type of Service and by Country

Facilitating service	Dominica	Grenada	St. Lucia	St. Vincent
Information:				
- existence of stat. unit	yes	yes	yes	yes
- existence of information unit	yes	yes	yes	yes
- computerized information	yes	no	yes	no
- type computer	BBC	-	IBM	-
- collection	good	ok	good	poor
- analysis	poor	poor	poor	poor (ad hoc)
Quality of information:				
- production	poor	poor	poor	poor
- prices	ok	none	ok	ok
- trade stats.(1)	ok	poor	ok	poor quality
- markets	needs improvement	poor	poor	poor
Extension:				
- # extensionists(2)	33	41	35	20
- # trained in:				
. postharvest	some	some	some	little
. marketing	exposure	exposure	exposure	exposure
Credit:				
- availability	yes	yes	yes	yes
- interest rates	low-high	high	high	med-high
. Commercial banks	10-14	12.5-14	12.5-18	11-15
. Development "	5.5-12(3)	9.5-14	12	6-12(3)
. Credit unions(4)	12	12	12	12
- collateral requirements	stringent	stringent	stringent	stringent
Farm Input Supply:				
- equipment rent	yes	yes	yes	no
- equipment loan	yes	no	no	yes
- equipment sales	no	no	no	no
- chemical sales	no	no	yes	no
- chemical grants	yes	no	ad hoc	ad hoc
- vet. drug sales	yes	yes	yes	yes
- seed sales	yes	yes	yes	yes
- plant sales	yes	yes	yes	yes
- spray service(5)	no	no	no	yes

Source: IICA research 1986-87

(1) Excludes traditional crops such as bananas, spices, cocoa for which statistics are relatively good.

(2) Number presently in place. (3) Lower rates are soft loans from IPAD.

(4) One percent per month on the reducing balance.

(5) Excludes spraying services offered by Banana/Cocoa Associations.

2. PREPRODUCTION, PRODUCTION & HARVEST

2.1 Preproduction

2.1.1 Existing Infrastructure for Plant Propagation

The propagation of fruit trees in the Windward Islands is carried out at 17 Ministry of Agriculture nurseries distributed as follows: Dominica 7, St. Vincent 6, St. Lucia 3, and Grenada 1. While some very small private nurseries exist, their outputs are not significant. One of the more important reasons for this situation is the fact that government nurseries tend to subsidize the costs of the plants.

The capacity, 1985 production and general conditions of the 17 government nurseries are presented in Table B-1. As can be observed, with the exception of Dominica, the actual production is well below the capacity of these nurseries. However, 16 of the 17 (Grenada excluded) nurseries are in need of repair and provision of new facilities such as mist propagation and humidity beds. The only Grenada nursery, in spite of its unused capacity, may need satellite nurseries in other locations to facilitate distribution on a national basis. In the particular case of St. Lucia, required repairs are presently underway as part of the USAID financed "St. Lucia Structural Adjustment Project." However, even here facilities for mist propagation and humidity beds are not included.

2.1.2 Personnel

The administration of the fruit nurseries in the Windward Islands is the responsibility of the propagation officer who reports to the respective Chief Agricultural Officer. In Grenada, this position has been vacant for the past 3 years. Technicians, most of whom are extension officers in the respective locations of the nurseries, assist in the coordination and administration of the nurseries. Of the 21 technicians identified, 8 work in Dominica, 6 in St. Vincent, 6 in St. Lucia and 1 in Grenada. Most of these technicians are skilled and experienced in traditional propagation techniques and nursery management methods. However, for a relatively long time they have not been exposed to modern methods and techniques. This may be one of the reasons for mistakes and errors that contribute to a lower overall quality standard of the plants being produced.

Of 37 skilled senior propagators, 12 are found in St. Vincent, 10 in St. Lucia, 9 in Dominica and 6 in Grenada. In general, it can again be said that these propagators, while skilled in traditional methods of propagation, need training in subjects related to upgrading the overall quality of the plants produced. e.g. "training" the plants at the nurseries, prevention of contamination and spread of virus and virus-like diseases, among others.

2.1.3 Planning, supply-demand and distribution of fruit trees produced in the Windward Islands.

The quantity, species and cultivars propagated at each nursery in the Windward Islands is theoretically planned on the basis of requests made

by extension officers, who act in accordance with the general needs of the farmers in their respective regions. Each nursery is supposed to distribute trees only to farmers within its' respective area of influence. However, in practice, due to the lack or delay of feed back from extension officers, the decision on what and when to propagate is carried out in all of the four islands by the respective propagation officers, based on their "experience". This situation results in an over production of certain species, e.g. passion fruit, soursop, cherries and cocoa in St. Vincent, limes in Dominica, soursop and other exotics in St. Lucia, etc.. These tend to remain in the nurseries for long periods of time at the expense of other species in high demand but for which quantities are usually in short supply. Furthermore, in many cases, and due to this unexpected shortage in the supply of some species, e.g. citrus in St. Lucia, orange and avocado in St. Vincent, it is common to see farmers coming from long distances to get the desired plants. Of all the fruit species propagated in the Windward Islands, those for which the demand usually exceeds the supply are the following: sweet oranges and grapefruit in St. Lucia, mango in Grenada and St. Vincent and sweet orange in Dominica.

Neither the method of planning nor that of distribution permits efficiency within the propagation/distribution system. Advanced booking is not enforced, consequently required data for good planning is unavailable.

2.1.4 Propagation Process and Source of Planting Material

The propagation process and the sources of planting materials are in great part responsible for the overall quality of the plants prepared by the nurseries and thus of the quality of the fruit eventually produced by the plants. Table B-2 summarizes the propagation process for given fruit species in the 4 Windward Islands. As can be appreciated, the propagation methods employed present very little variation from one country to another.

The budding and grafting heights are not standardized, even in the same country. Low budding (less than 10 inches from ground level) may lead to a high incidence of diseases such as foot rot, particularly in citrus. Except in a few cases, the percentage of take from budding and grafting is generally within acceptable ranges. Exceptions are avocado in St. Vincent (as low as 35%) and Grenada (as low as 40%). In most cases there is a significant drop in the % of take during the rainy seasons. Several wrapping and covering methods are known to be useful in overcoming this problem. However, in general, they are not being practiced in the nurseries of the Windward Islands.

With the exception of avocado in St. Lucia (60%) and avocado and mango in St. Vincent (as low as 50%), the overall survival rate at the end of the propagation process is generally acceptable for all species included in the study. Dieback, mainly caused by Phytophthora, is the principal cause for the low survival in avocado, while "shock" during the first transplanting is the main cause of loss in mango.

None of the 17 nurseries have described "standards" for the preparation of the fruit species being propagated. This increases the probability of

propagating plants of low quality and of a wide variation from plant to plant, even for the same species at the same nursery.

In most cases, the time from seed until the plant is ready to be released by the nursery is relatively short (Table B-2). In many cases this has a direct effect on the overall quality of the plants because they are released at too young a stage. In all nurseries, it was found that plants, particularly citrus, were not "trained" to a proper height before release to farmers. This practice makes more work for the farmers who must then reshape the tree after planting, which they often do not do, and eventually leads to spoilage of fruit produced on the lower branches, as well as a higher incidence of soil-borne pests and diseases, in addition to other detrimental effects.

Table B-3 summarizes the sources, conditions and availability of seeds, budwood and cuttings used by the nurseries in each country in the propagation of fruit trees. The most serious problem of rootstock tends to be with avocado in Grenada, St. Lucia and St. Vincent, where from 85 to 100% of the required seeds are obtained from "any" available source. This practice is partially responsible for the low survival of avocado nursery plants in St. Lucia and St. Vincent (Table B-2).

It is always preferable for the nursery to build up its' own source of seeds for propagating citrus plants. In this way it may be possible to prevent the spread of inferior quality stock as well as pathological or genetical problems. In the Windward Islands, with the exception of Grenada, citrus seeds are obtained from fruits purchased directly from different farmers. In Grenada, 90% comes from their own source (Table B-3).

Mango rootstocks are obtained from seeds, sometimes purchased as fruit and sometimes as the seed alone, or directly from seedlings dug from the ground. Seedlings tend to be used in St. Vincent and Grenada, fruits and seeds in Dominica and seeds only in St. Lucia. While the use of seedlings speed up the propagation time, this method is questionable because of the lower survival rate and other disadvantages.

Although virus indexing has not been carried out within the sub-region, since citrus plants are introduced from a variety of sources, some unreliable, and the fact that Citrus Exocortis, Xyloporosis and Psorosis are spread world wide, suggest the probability of their presence in the Windward Islands. Since citrus budwood is often obtained from unreliable sources, this becomes the major problem in the use of budwood. Of the four countries, only Dominica has a virus free plot and even this has not been properly managed and kept in a condition to avoid contamination.

Quantity of budwood does not seem to be a problem for the existing cultivars, except in Grenada and St. Lucia where there is a shortage of budwood for high quality avocados. Quality of budwood, however, is a problem. In general, museum plots are not provided with the proper care, leading to the propagation of plants of inferior quality and contributing in many cases to the spread of pests and diseases. With the exception of Dominica, new early, late and other mid-season cultivars in high demand are commonly missing from the museum plots.

Breadfruit cuttings seem to be available in sufficient quantity. However, in spite of the existence of superior clones, propagation is normally done from any source near the nurseries, thus the opportunity to upgrade quality and production is lost.

2.2 Production

2.2.1 Cultivars and Seasonality

The production of fruits in the Windward Islands is based on a wide range of cultivars and local seedlings. In the case of mango and avocado, the bulk of the production still comes from volunteer or planted seedlings of the local type. This is not the case with citrus since nearly all production comes from introduced or selected cultivars.

The most important cultivars being propagated and planted in the Windward Islands are identified by country in Table B-4. There is some similarity in the cultivars in the four islands. For mango cultivars, Julie is the most important in Dominica, Grenada and St. Vincent while Graham is predominant in St. Lucia. Many of the Florida cultivars have been introduced into the sub-region. Specifically, Dominica and St. Lucia have established experimental plots, but the consensus is that they are shy bearing and more demanding in cultural practices than the so called "W.Indian" mangoes (Julie, Graham, Imperial, long, etc.). This factor has restricted their popularity, propagation and planting.

A considerably large number of avocado cultivars, with a wide variation in size, shape, colour and taste, are being propagated and planted in the Windward Islands. Dominica boasts the largest number of cultivars, most of which originated from Puerto Rico (Semils and Gripinas). However, a local selection (Dominica selected) is still the most important cultivar. Pollock, Simmonds and Lula are among the most popular in the other islands.

In the case of orange, Washington navel is the most popular cultivar in Dominica, Grenada and St. Lucia, while Valencia is the preferred cultivar in St. Vincent (Table B-4).

Traditionally, Marsh seedless has been and remains the most important cultivar of grapefruit in the sub-region. More recently, Ruby red has become the cultivar of preference for new plantings, particularly in Dominica. Other cultivars include Thompson pink, Foster and Duncan.

The West Indian lime is by far the most important lime cultivar but more recently the Tahiti or Persian lime has been gaining in popularity in all four Islands.

The wide range of cultivars and types within the different fruit species being planted in the Islands has contributed to extend the harvest season for most fruit commodities. Table B-5 summarizes, by country, the harvest seasons for mango, avocado and citrus. As can be observed, very little variation exists when comparing the peak seasons of these species from Island to Island. While the overall season for the planted cultivars extends for 7 months for mango, 8 months for avocado, 7 months for

grapefruit and orange and 8 months for lime, the peak only extends for 2, 3, 3, 2 and 5 months respectively.

The mango season starts earlier in Grenada and St. Lucia (April) and ends latest in Dominica (November). The avocado season begins first in Grenada (June) and ends last in Dominica and St. Vincent (March). Oranges are first harvested in St. Vincent and continue bearing longest in Dominica and Grenada while grapefruits start bearing as early as August in St. Vincent and Dominica and end as late as April in Dominica. Limes on the other hand are produced during most of the year in the four Islands, except during the months of January-March when yields are very low. There does appear to be some differentiation in the case of Grenada where the season is reported to extend longer and peak later.

2.2.2 Establishment and Cultural Practices

The most commonly used establishment and cultural practices for the production of non-banana fruits are summarized by country in Table B-6. As can be observed, organized spacing is only found in the few cases where there exists pure stands of commercial orchards. Intercropping is a very common practice in the four Islands. This leads to a pattern of scattered plantings. Banana is by far the most common crop which is intercropped with fruit trees. Others include cocoa, coconut and, particularly in St. Vincent, various food crops. In general, fruits receive beneficial effects from intercropping but it is not uncommon for negative effects to result due to mismanagement. Some of these beneficial and/or negative effects are identified by country in Table B-6.

In the case of windbreaks for fruit trees, these are used only in a limited number of instances and are normally associated with the older groves. The frequency of weed control is usually unsatisfactory except when associated with banana production. Manual weeding is the most common, followed by a combination of manual and chemical (Paraquat). There is no mechanical weeding.

With the exception of new plantings in St. Vincent, pruning of fruit trees is an uncommon practice in the Windward Islands. In some cases maintenance pruning and tree shaping are carried out but the frequency and degree are unsatisfactory.

In the four Islands, the fertilization of fruit trees tends to be a haphazard process (Table B-6). With the exception of the new plantings under the TCDP in Dominica, the OCDP in St. Lucia and fruit trees intercropped with high income crops (bananas, cocoa, etc.), fertilization is rarely carried out. Even in these cases, the frequency and amounts are determined in an empirical manner and in many instances are insufficient.

Of all fruit orchards in the Windward Islands, irrigation is carried out only in St. Lucia, and this indirectly. Only some 10% of the fruit stands receive irrigation, in association with bananas. All other stands are rainfed.

Pest and disease control measures are the least common of all cultural practices. Only in a few cases are corrective spray treatments carried out.

2.2.3 Pests and Diseases

Pests and diseases of quarantine significance are recorded in Table B-7. The most serious pests/diseases tend to be crop specific, i.e. mango seed weevil and moko disease affecting bananas and plantain. At present, moko disease is restricted to Grenada and the mango seed weevil has only been identified in Dominica and St. Lucia. The presence of the latter pest has closed the doors for exporting mangoes to the Barbados and USA/Virgin Island markets. Very little is known about the mango seed weevil and the feasibility of its control or eradication. Measures are being taken to control/eradicate moko disease in Grenada but these are unlikely to be totally effective owing to the nature of the disease.

In the case of fruit flies of quarantine significance, only Anastrepha obliqua has been reported and this only in Dominica and St. Lucia. Since this pest is found in many producing countries it is considered less of a threat for quarantine purposes. At the present time, a fruit fly detection survey is underway in Grenada and St. Vincent (MOA/APHIS/USAID/IICA) and plans are being made for a similar effort in St. Lucia and Dominica in 1987. With more than half way through the 18 month time period of the survey, no fruit flies of quarantine significance have yet been found in either Island (May, 1987).

The pests and diseases of economic significance which affect production and quality are identified in Tables B-8 & B-9. These pests and diseases are common to all of the Windward Islands and impact negatively on production by reducing the photosynthetic capacity, and nutrient uptake, (Table B-8) among other things.

Pests and diseases also have a direct impact upon the quality of the fruit (Table B-9), external discolouration and unsightly markings, or lowering of the internal quality.

While governments have a clearly defined role in the identification of pest/disease problems, promotion of control programs and the establishment of effective plant quarantine systems, the lack of both human and financial resources has not permitted the development of effective execution of programs. All countries but Dominica have a Crop Protection Officer heading a Crop Protection Unit but in none of the Islands have the units reached the level of effectiveness, nor has the Extension Divisions developed the basic skills, required for a successful tree crop development program, in spite of attempts to subsidize chemicals and the sponsoring of spray teams by the Ministries of Agriculture. Although IICA is developing crop protection projects in Grenada, St. Lucia and Dominica, the lack of adequate resources have prevented the full attainment of their goals.

There are physical factors in the islands (Table B-10) that are detrimental to both fruit production and quality. Among the most common of these factors are overshadowing, heavy rainfall, high humidity, excessive

dry periods, strong winds and water logging. This suggests the need for effective crop zoning.

2.2.4 Production, Acreage & Yields

Available statistics on production, acreage and yields are scarce, contradictory and unreliable. The Ministries of Agriculture and Trade tend to give emphasis to trade statistics and little effort has been made to establish an information reporting system on fruit production.

Given the practice of planting fruit trees in a scattered pattern - a few trees of many species in a non-organized pattern and on many farms - combined with weak extension systems, has all but made it impossible to develop an accurate reporting system. Where reliable information exists, it has been the result of specific surveys or censuses, e.g. MOA census of citrus in Dominica in 1985, Survey of 179 fruit tree growers in St. Lucia carried out by IICA/MOA/EDD in 1985.

As a result of the above studies, some reliable information is available on number of trees, cultural practices and priority problem areas, however, it is still impossible to determine the total production or even total acreage.

Due to the scattered nature of fruit tree plantings, acreage is usually expressed in acre-equivalents, however, total acreage will vary considerably depending on the base number of trees per acre-equivalent used. For example, based on a count of 185,031 grapefruit trees in Dominica, if we divide by 50 trees/acre, as used by EDD, 70 trees/acre, as used by MOA, or 28 trees/acre, as done in some other countries, we get 3700, 2643 or 6608 acre-equivalents, respectively. There is also a tendency to use the same base number for similar species within a group, e.g. citrus. This can lead to extreme errors in calculations of acreage.

Other realities which complicate further both the collection and use of information on fruit tree production are the age or maturity of the tree, number of planted trees which may have died, type cultivar, cultural practices used and the environmental factors, among others. There is a direct relationship between both volume and quality of production and these mentioned variables.

The best available information on fruit production, acreage and yields is presented in Tables B-11, B-12, B-13 and B-14. The more accurate statistics are the case of UK bananas, but even here there is a certain amount of guesswork when it comes to determining acreage and yields per acre. This is due to several reasons: considerable quantities of bananas are produced on farms of mixed plantings; there is a large number of very small producers who do not keep good records and monitoring is both time consuming and expensive.

Table B-13 presents the range of trees per acre and tonnes per acre of expected yields obtained from non-Windward Islands. It also presents the number of trees per acre based on the EDD report. Using these numbers and Table B-11 it was possible to estimate tonnes of yield per acre in 1985. As can be observed between the four Islands, the results are so extreme, e.g. 13 tonnes/acre of avocados in Grenada and 0.1 tonnes/acre

in St. Lucia, that it does little more than point out the general weakness of available fruit production statistics. Even in the case of Dominica (Table B-13) data from two different sources shows unexplicably wide variation by fruit species. A survey of citrus trees was carried out in Dominica in 1986 and the results are reported in Table B-14. Although reliable data was obtained on number of trees, the acreage figures are estimates and yield per acre still remains unknown.

The only valid conclusion that can be made in this section is that production, acreage and average yields per acre are unknown, with the exception of a very few particular cases.

2.2.5 Comparative Advantage with Respect to Costs of Production

In the Windward Islands, with the exception of bananas, there are no reliable data on production costs of tree crops. Therefore, the information presented in Table B-15 is only a comparison of the costs of key elements in a tree fruit production programme. The purpose of presenting this information is to get some idea of the comparative advantage of producing tree crops in the Windward Islands, vis a vis the Dominican Republic, which has a relatively low cost of production; Barbados, with relatively high cost of production, and Florida, with high costs of production and a major importer at the same time. To facilitate the interpretation of the data, indices giving a value of 100 to Florida costs are presented.

In respect to the cost of land, both for outright purchase and lease, the Sub-region as a whole is in an acceptable position. Land with good growing conditions is available and can be obtained within reason. The Dominican Republic does represent a major competitor (and probably Haiti as well) but land cost in the Windwards should not be considered a serious constraint.

In the case of labour costs, the sub-region has considerable advantages over Barbados and Florida. Here again, however, labour costs in the Dominican Republic (also in Haiti although not shown) are less than half the costs reported in each of the Windwards.

The costs of both diesel and gasoline are generally 100% higher within the Sub-region than in the Dominican Republic or Florida, although on par with Barbados. In the case of truck rental, however, there is only significant difference in cost with the DR, which is much lower.

In the case of herbicides, fungicides, insecticides and fertilizers, there is considerable difference in prices both within the Sub-region and with countries outside the Sub-region, depending on the particular product. In some cases prices are lower within the Sub-region than in Florida and in others they are higher. Prices within the Sub-region vary depending on the source, the volume handled and whether the product is taxed or subsidized among others. The important thing is that, in most cases, the necessary chemicals are or can be made available within the Sub-region and at competitive prices. In some cases, competitive prices may require government removal of taxes or extending certain benefits accruing to banana growers to non-banana farmers, but the potential is there, only the mechanisms need to be established.

In the case of equipment required for growing tree crops, the situation is similar to that of chemicals. In at least one country of the Sub-region, items such as knap sack sprayers or mist blowers can be obtained at prices competitive with those in other countries. This may not be the case when compared to the Dominica Republic since low prices in that country are closely related to the declining value of the Peso and Government subsidies.

2.3 Harvest Practices

The practices used for harvesting fruit in the Windward Islands is directly related to the intended market, i.e. greater care is taken when the produce is destined for export. The tendency is for farmers to minimize their harvest costs. If the produce is to be sold in local markets they may shake the trees and not be too concerned with bruising. On the other hand, if the fruit is purchased by exporters, while still on the tree, trained crews of specialists may harvest with considerable care. New suppliers of produce to exporters will also try to harvest rapidly and "slip in" bruised produce obtained in the process. Produce such as avocados, which readily show bruising, tend to be harvested with greater care when sold to exporters as the farmer knows the buyer will reject all those with signs of bruising. Table B-16 presents the principal methods of harvesting used in the Windward Islands. Tools tend to be limited to hooked sticks, v-shaped poles, ropes, sacks, a few poles with bags and sometimes cutters or clippers. The most common practice is that of climbing the trees and throwing the fruit to assistants on the ground, lowering it in buckets or sacks or just letting it drop. Due to tree height and brittleness of limbs, breadfruit is frequently allowed to drop to the ground during harvest, causing considerable damage.

Table B-1: Capacity, Production and General Conditions of Nurseries
in the Windward Islands, 1986

Characteristics	Dominica	Grenada	ST. Lucia	St. Vincent
No. nurseries	7	1	3	6
Capacity (plants)	120000	50000	40000	45000
Total production of plants (1985)	113000	12411	30577	26561 (1)
Distribution of plants (1985)				
- # plants	58995		29432	13630 (1)
- % of total	52		96	51 (1)
Condition of nurseries	needs repairs	good	needs repairs	needs major repairs
Missing infrastructure & equipment	-Mist & humidity beds -Soil sterilizer	-Other nurseries -Soil sterilizer	-Mist & humidity beds -Soil sterilizer	-Soil shed -Mist unit -Humid. beds -Soil sterilizer

Source: IICA Nursery Surveys, 1986

(1) Only for the two major nurseries.

Table B-4: Most Important Cultivars (1) being Propagated and Planted by Country
in the Windward Islands

Species	Dominica	Grenada	St. Lucia	St. Vincent
Mangoes	Julie	Julie	Graham	Julie
	Long (kidney)	Graham	Julie	Imperial
	Graham	Ceylon	Locals	Ceylon
	Fla. cultivars	Peach	Florida	Local
	(Haden, Irwin	Imperial	cultivars	seedlings
	Tommy Atkins	Local	(Haden, Kent,	
	Keitt, Kent,	seedlings	Keitt, etc.)	
	Zill) (2)		(2)	
Other locals				
Avocadoes	Dominica (local)	Locals	Pollock	Simmonds
	Pollock	Pollock	Simmonds	Pollock
	Simmonds	Simmonds	Fuerte	Lula
	Semil 31	Lula	Lula	Locals
	Semil 34	Hall	Booth B	
	Semil 43	Booth	St. Croix	
	Lula	Choquette	Francois	
	Tonnage	St. Joseph	Other locals	
	Gripina 5	Evans 1 & 2		
	Gripina 12			
Oranges	W. Navel	W. Navel	W. Navel	Valencia
	Valencia	P. Brown	Valencia	P. Brown
	Hamlin	Pineapple		Pineapple
	Pineapple	Valencia		W. Navel
	Laubs summer			
Grapefruit	Ruby Red	M. seedless	M. Seedless	M. Seedless
	M. seedless	Duncan	Duncan	T. pink
	Thompson pink		Ruby red	Duncan
	Duncan		Foster	
			Thompson pink	
Limes	W. Indian(3)	W.I.	W.I.	W.I.
	Tahiti(4)	Tahiti	Tahiti	Tahiti

Source: IICA survey

(1) Presented in order of importance.

(2) Propagation and planting of these cultivars is minimum.

(3) Same as Key or Mexican lime.

(4) Same as Persian or Bear lime.

Table B-5: Seasonality of some Fruit Species by Country in the Windward Islands

Species	Dominica	Grenada	St. Lucia	St. Vincent
Mangoes:				
- Season	May-Nov.	April-Oct.	April-Sept.	May-Sept.
- Peak	July-Aug.	July-Aug.	June-July	June-Aug.
Avocados:				
- Season	July-March	June-Jan.	July-Jan.	July-March
- Peak	Aug.-Nov.	Aug.-Sept.	Sept.-Oct.	Aug.-Oct.
Oranges:				
- Season	Sept.-March	Aug.-March	Oct.-Feb.	June-March
- Peak	Dec.-Jan.	Nov.-Dec.	Nov.-Dec.	Nov.-Dec.
Grapefruit:				
- Season	Aug.-April	Nov.-Feb.	Oct.-March	Aug.-March
- Peak	Nov.-Feb.	Dec.-Jan.	Dec.-Feb.	Nov.-Feb.
Limes:				
- Season	April-Dec.	Sept.-Feb.	May-Dec.	May-Dec.
- Peak	June-Oct.	Oct.-Dec.	June-Oct.	June-Aug.

Source: IICA survey.

Table B-6: Common Establishment and Cultural Practices used by Farmers in the Production of Non-banana Fruits by Country

Practice	Dominica	Grenada	St. Lucia	St. Vincent
ESTABLISHMENT PRACTICES:				
Spacing:				
-Scattered	when <10 trees	most fruits	most cases	small holdings mixed crops
-Organized	when >10 trees	some fruits	few cases	pure stand orchards
Intercropping:	common	relatively common	very common	very common
-Species of intercrop:	bananas	bananas cocoa foodcrops	bananas	bananas coconuts
-Beneficial effects of intercropping:				
. nutritional	X	X X	X	X X
. weed control	X	X X X	X	X X
. pest/disease control	X	X	X	X
-Negative effects				
. shading	X	X X	X	X X
. space competition	X	X X X	X	X X
. drifting of pesticides	X	X X X	X	X
Wind Breaks:	not common	traditional	not common	not common
-Proper use	old estates	old groves	very few cases	some cases
-Not used	most cases	new plantings	most cases	most cases

Continuation of Table B-6

Practice	Dominica	Grenada	St. Lucia	St. Vincent
CULTURAL PRACTICES:				
Weeding:				
- Type:				
. manual	x	x	x	x
. chemical			x (paraquat)	x (paraquat)
. mechanical	none	none	none	none
. manual/chem.	x (paraquat)	x (paraquat)	x (paraquat)	x (paraquat)
- Frequency of weeding	unsatisfactory for nonbanana production	very unsatisfactory	relatively satisfactory OCDP farms	unsatisfactory for non-banana production
Pruning:				
- Type	some cases maintenance	very rarely maintenance	some cases shaping, maintenance	common new plantings shaping, size control maintenance
- Frequency of pruning	unsatisfactory	very unsatisfactory	unsatisfactory	unsatisfactory
Fertilization:				
- yes	tree crop diversification projects	indirect benefits from banana/cocoa	orchard crop diver. project	most common with banana intercrop
- no	non diversification farms	non banana/cocoa farms	most cases	
- Formula used:				
. Banana (1)	12-12-24-4	16-8-24-2	16-8-24-2	16-8-24-2
. Other	Amon. Sulph. Superphosphate Potash		20-10-10 Amon.Sulphate	12-8-24-2 Amon. Sulphate
- Amount/tree(2)	0.5 kg/year on OCDP farms	unsatisfactory	4 kg year (OCDP)	0.4 kg/year
- Frequency/year	once (twice bananas)	once (twice bananas)	3 times under OCDP (twice bananas)	once (twice bananas)
Irrigation:				
- Frequency	none	none	90% rainfed 10% irrigated (3)	none
Spray treatments:				
- Prevention	98% no spray	none	rarely	program suspended
- Corrective	few cases	banana/cocoa only	few cases	few cases

Source: IICA/MOA Baseline Country documents, 1986

(1) Formula used on bananas changes from time to time.

(2) In those cases where fruit trees are intercropped with bananas they receive additional nutritional value.

(3) These 10% tend to be intercropped with bananas.

Table B-7: Pests and Diseases of Quarantine Significance Affecting Fruit

Pest/Diseases	Dominica	Grenada	St. Lucia	St. Vincent
Pests:				
- mango seed weevil	present	not recorded	present	not recorded
- fruit fly	recorded (A. obliqua)	not recorded	recorded (A. obliqua)	not recorded
Diseases:				
- moko (1)	none	present	none	none

Source: Revision of existing publications and interviews with specialists in the field, 1986

(1) Affects banana

Table B-8: Pests and Diseases of Economic Significance (1) Affecting
Production of Fruit

Post/Diseases	Dominica	Grenada	St. Lucia	St. Vincent
Pests:				
- mango seed weevil	mango*	not recorded	mango*	not recorded
- scales, mites thrips, aphids nealy bugs (citrus avoc., mangoes, etc)	all fruit	all fruit	all fruit	all fruit
- Citrus weevil (Diaprepes sp.)	all citrus*	all citrus breadfruit	all citrus	not recorded
- banana borer and nematode (banana/plantain)	banana plantain	banana* plantain	banana plantain	banana* plantain*
- Coconut mite	coconut*	coconut*	coconut*	coconut*
Diseases:				
- anthracnose (mango avocado, citrus)	mango* avocado limes	mango* avocado limes	mango* avocado* limes	mango* avocado* limes
- greasy spot (citrus)	all citrus	all citrus	all citrus*	all citrus
- sooty mould	most fruit	most fruit	most fruit*	most fruit*
- foot rot	avocado* citrus	avocado citrus	avocado citrus	avocado citrus
- root rot	avocado	avocado citrus	avocado citrus	avocado citrus
- rosellinia	not recorded	breadfruit* nutmeg*	not recorded	not recorded
- Citrus melanose	gfruit*	orange grapefruit	most citrus	most citrus
- moko (plantain)	not recorded	banana* plantain*	not recorded	not recorded
- bunchy top	paw paw*	paw paw*	paw paw*	paw paw*
- Erwinia sp.	not recorded	not recorded	paw paw	not recorded

Source: Determined from existing publications, interviews with specialists
in each country and field visits, 1986

(1) Economic significance implies either decreases in yields, increases
in production costs or both.

* Indicates fruits most commonly affected.

Table B-9: Pests and Diseases of Economic Significance (1) Affecting Quality of Fruit

Pest/Diseases	Dominica	Grenada	St. Lucia	St. Vincent
Pests:				
- birds	mango, oranges	mango, soursop, sapodilla	mango* oranges*	mango
- mites, scales, thrips, mealy bugs	all fruits	all fruits	all fruits	all fruits
- fruit piercing moth	mango, orange	guavas	orange	not recorded
- fruit fly (A. obliqua)	mango, citrus	not recorded	plums	not recorded
Diseases:				
- anthracnose (mango, avocado, citrus)	mango* limes	mango* limes	mango* avocado limes	mango* avocado
- melanose(citrus)	grapefruit*	present	grapefruit orange	orange
- sooty mould (2)	grapefruit*	most fruit*	all fruit	all fruit
- scab (citrus, avocado)	citrus*	citrus,* avocado	citrus*	oranges* grapefruit*

Source: Determined from existing publications, interviews with specialists in each country and field visits, 1986

(1) Economic significance implies either decreases in volumes available for market, increases in costs for maintaining quality or both.

(2) Has significant negative impact on quality of fruits bound for external markets.

* Indicates fruits most commonly affected.

Table B-10: Physical Factors of Economic Significance to Production and Quality

Factor (1)	Dominica	Grenada	St. Lucia	St. Vincent
Overshading: (2)	common	common	common	common
- Effect on production:	reduced photosynthesis, consequently lower yields			
- Effect on quality:	reduced brix & ratio brix/acidty			
Beavy rainfall:	most areas	some areas	some areas	some areas
- Effect on production:	flower and fruit drop, reduced yields			
- Effect on quality:	reduced brix & acidity, may cause splitting of fruits			
High humidity:	most areas	some areas	some areas	some areas
- Effect on production:	high incidence of diseases, flower/fruit abortion, leaf drop & yields reduced.			
- Effect on quality:	damage by diseases			
Excessive dry periods:	some areas sporadic	common sporadic	common sporadic	common sporadic
- Effect on production:	flowering & fruit-set stop, flower/fruit drop, yields are reduced.			
- Effect on quality:	smaller size of fruits, eventual fruit splitting			
Strong winds:	specific areas	specific areas	specific areas	specific areas
- Effect on production:	leaves, flower & fruit drop, snapping of twigs/liabs, yields reduced.			
- Effect on quality:	wind scar.			
Soil:				
- water logging	localized	localized	localized	localized
- Effect on production:	leaves, flower & fruit drop, root system reduced, die back of twigs & branches, yields reduced.			
- Effect on quality:	reduced overall internal quality of fruits			
- shallowness	localized	localized	localized	localized
- Effect on production:	poor root system, reduced size of tree, yield reduced.			
- Effect on quality:	smaller fruits, low internal & external quality			
- compaction by animals	insignificant	insignificant	common	unknown
- Effect on production:	restricted growth, die back of branches due to reduced root system, lower yields.			
- Effect on quality:	smaller size fruit, reduction in internal/external quality.			

Source: IICA research and interviews with specialists in the field, 1986

(1) These are general negative effects which may affect the volume and quality of production. The specific effects will be felt to a greater or lesser degree depending on the country and the local circumstances.

(2) Mainly due to intercropping with bananas.

Table B-11: Production and Acreage of Selected Fruits in the Windward Islands
by Country, tonnes, 1985

Fruits	Dominica		Grenada		St. Lucia		St. Vincent		Total	
	Acres	Tonnes	Acres	Tonnes	Acres	Tonnes	Acres	Tonnes	Acres	Tonnes
Bananas (1)	4220	33963	2000	8007	12500	81986	7226	40078	30446	164034
Mixed farms	9000									
Mangoes	598	600	217	1702	350	250	300	2296	1465	4848
Avocados	238	163	117	1549	150	20	91	315	596	2047
Oranges	1217	580	198	917	600	600	50	375	2065	2472
Grapefruit:									2960	7878
- white	1615	5042	>234	2113	410	377	>111	167		
- red	450	156	>		140	23	>			
Limes	1235	1220	68	332	100	100	180	182	1583	1834
Other cit.	50	75	50	75	75	100	16	51	191	301

Source: BDD report for non-banana fruit. WINBAN for bananas.

(1) 1985 exports. In the case of Dominican bananas some 9000 acres grow bananas mixed with other crops.

Table B-12: Projections of Acreage and Production (tonnes) of Selected Fruits
under Existing Plans, by Country, 1995

Fruits	Dominica		Grenada		St. Lucia		St. Vincent		Total	
	Acres	Tonnes	Acres	Tonnes	Acres	Tonnes	Acres	Tonnes	Acres	Tonnes
Bananas (1)	15000	75000	2800	12000	15000	124500	9000	51300	41800	262800
Mangoes	712	1740	257	1762	620	1810	400	2596	1989	7908
Avocados	288	640	157	1639	150	300	101	340	696	2919
Oranges	1417	2800	208	942	660	1680	60	405	5264	5827
Grapefruit:									3094	13180
- white	1629	7057	>254	2173	415	865	>121	307		
- red	530	1963	>		145	815	>			
Limes	1305	3175	78	357	120	360	182	277	1685	4169
Other cit.	80	200	60	125	75	150	21	61	236	536

Source: BDD report for non-banana fruit.

(1) Projections (1990) from Banana Associations.

(2) Based on average production of 5 tonnes per acre.

Table B-13: Number of Trees and Production per Acre of Selected Fruits in the Windward Islands and Other Major Producing Countries

Average Yield and Trees per Acre								
CROP	Other Countries		# trees/acre Windward Is. BDD report	Dominica		Grenada	St. Lucia	St. Vincent
	trees	tons./ acre		BHP(1) t/a	BDD t/a	BDD t/a	BDD t/a	BDD t/a
Mangoes	20-64	6.0	48	3.2	1.0	8.0	0.7	7.7
Avocadoes	64-81	9.0	60	13.6	0.7	13.0	0.1	3.5
Oranges	81-110	9.0	65	13.6	0.5	4.6	1.0	7.5
Grapefruit	28-64	14.0	50	9.0	2.5	9.0	0.9	1.5
Limes	110-190	9.0	145	6.8	1.0	5.0	0.2	1.0
Breadfruit	27-40	12.0	*	isolated scattered trees throughout				
Bananas 1985 (2)				2.6(3)	4.0	6.5	5.5	

Source: Other countries, IICA research. Windward Islands, BDD report. Bananas, WINBAN data.

- (1) Estimated national production, MOA.
- (2) Average tonnes per acre of exportable bananas in 1985.
- (3) Of total acreage (13220) of bananas some 9000 acres are producing mixed crops thus this average yield per acre has little meaning.

Table B-14: Number of Citrus Trees and Acreage in Dominica, 1986

Species & Cultivar	Number farms	Number trees	Number acres
Grapefruit:			
- Marsh		164 602	2 351
- Ruby Red		20 429	292
Orange:			
- Washington navel		69 469	992
- Valencia		18 270	261
Limes:			
- West Indian		6 397	91
Other citrus		7 436	106
Total	1 601	286 603	4 093

Source: MOA Citrus Survey, 1986.

Table B-15: Comparative Advantages of Selected Inputs by Selected Countries January, 1987 (US\$)

Cost item	Dominica	Grenada	Saint Lucia	Saint Vincent	Dom. Republic	Barbados	Florida (Homestead)
Farm land (acre):							
- cost	\$500-4000	\$2200-4500	\$950-5600	\$2900-5600	\$100-500	\$2500-5000	\$25000
index	16	18	22	22	2	20	100
- lease	40	100	30		30	50	250
index	16	40	12		12	20	100
Ag. Labour: (man-day)							
- women	4-6	4-5	5-7	3-4	2-3	18.76	44.00
index	9-14	9-11	11-16	7-9	5-7	44	100
- men	7-9	5-6	7-9	4-6	2-3	18.76	44.00
index	16-20	11-14	16-20	9-14	5-7	44	100
Transport:							
- diesel (gal)	1.86	1.45	1.87	1.73	0.79	1.52	0.83
index	224	175	225	208	95	183	100
- gasoline (gal)	2.24	1.87	1.87	1.99	0.79	1.79	0.78
index	282	240	240	255	101	229	100
- contract/day/ truck & driver	170	168		168	100	150	160
index	106	105		105	63	94	100
Herbicides:							
- Gramoxone (l)	4.48	5-8	5.60	5.97	4.37	8.20	11.50
index	39	43-70	49	52	38	72	100
- Round up (l)	30.56	29.66	28.58	22.39	18.41	22.45	19.22
index	159	154	149	116	96	117	100
- Diuron (kg)	n.s.	n.s.	n.s.	n.s.	11.00	7.70	11.10
index					99	69	100
- Hyvar (kg)	n.s.	n.s.	n.s.	n.s.	-	36.35	25.85
index						141	100
Fungicides:							
- Benlate (kg)	28.00	20.00	20.43	18.65	19.05	30.78	24.20
index	116	83	84	77	79	127	100
- Kocide 101 (kg)	n.s.	n.s.	5.84	5.33			3.61
index			162	148			100
- Cupravit (kg)	n.s.	3.43	3.41	n.s.	4.00	6.60	4.00
index		86	85		100	165	100
- Dithane M-45 (kg)	n.s.	15.86	n.s.	9.85		12.22	4.15
index		382		237		294	100
Insecticides:							
- Malathion (l)	6.34	6.90	17.15	5.04(1)	12.70	12.76	4.75
index	133	145	361	106	267	269	100
- Decis (l)	83.50(2)	89.38(2)	49.60	49.45(1)	36.19	44.86	n.s.
index							
- Sevin (lb)	12.00(2)	4.06	2.20	5.22(1)	3.65	4.69	3.10
index	387	131	71	168	118	151	100

continuation of Table B-15

Cost item	Dominica	Grenada	Saint Lucia	Saint Vincent	Dom. Republic	Barbados	Florida (Homestead)
Fertilizer: (3)							
- banana							
formula (100lbs)	8-10	11-16	12-13	11-12	9-10(8)	24.00(4)	8.00(4)
index	100-125	138-200	150-163	138-150	113-125	300	100
- 15-15-15 (100lb)	n.s.	n.s.	n.s.	n.s.	9.44	23.50	7.85
index					120	299	100
- 20-20-5 (100)	n.s.	n.s.	n.s.	12.21(1)			
- ammonia							
sulphate(100lbs)	11.57	8-12	8.60	9.33	7.18	24.50	6.55
index	177	122-183	131	142	110	374	100
Equipment:							
- cutlass	5.60	3.29	3.20	3.40	3.18	4.83	4.95
- index	113	66	65	69	64	48	100
- pruning shears	16.00	7.00	9.00	9.50	8.00	10.00	12.50
- index	128	56	72	76	64	80	100
- knap sack sprayer							
(CP-3) 20 liter	106.50	176.86	87.0(5)	84.00	111.00	122.50	120.00(5)
- index	89	147	73	70	93	102	100
- mist blower							
(solo 423)	483.00	700.00(6)	320.00	448.00	143.00	551.00	415.00
- index	116	169	77	108	34	133	100

Source: IICA research, 1987

(1) ORD prices

(2) Common for there to be only one retailer thus prices sometimes very high.

(3) Banana fertilizer prices are frequently subsidized.

(4) Banana formula equivalent.

(5) Solo brand.

(6) Brand name Hurrican Minor.

Table B-16: Most Common Methods of Harvesting, Fruit Crops and Tools Used during Harvest, by Country

Method of Harvest	Dominica	Grenada	St. Lucia	St. Vincent
Shake trees	citrus		citrus	
Climb/pick/throw	citrus, mango avocadoes	most fruits	citrus, mango, avocado, soursop	
Climb/pick/bucket		avocadoes, mangoes	mango, avocado	
Hooked stick/pull	limes	mango, avocado bfruit, citrus		
V-Pole/push/twist	breadfruit	breadfruit	breadfruit	breadfruit
Pole/sack	mango, avocado	soursop, avocado	mango, avocado, soursop, citrus	
Pole/cutter/sack	breadfruit	being introduced	mango, avocado	

Source: IICA research.

3. POSTHARVEST HANDLING

3.1 Postharvest Handling Practices

Of all the fruits exported from the Windward Islands, only banana, in the four Islands, and grapefruit in Dominica, have organized postharvest systems oriented towards maintaining product quality (Table C-1). In the case of banana, the product is harvested at the right stage of maturity, cut and trimmed, latex drained, hands selected, fungicide treated pads applied to the cuts and the hands packed in plastic lined banana boxes and then transported to the wharf where they are inspected before loading onto the Geest ships.

In the case of Dominica grapefruit, the fruit is selected and graded both at the farm and at assembly centres before transporting in plastic field crates to the co-operative packing house at Roseau. Before packing, the grapefruit may be placed in a degreening room. When ready for packing the fruit is run through a custom (FMC) pack line which spray washes with benlate added, mechanically dries, and waxes the fruit which are then packed by workers in cardboard boxes without divisions. The number of fruits per box varies with size. Improper operation of this system sometimes leads to low quality output.

In the case of other fruit destined to extra-regional markets, exporters tend to apply the minimum postharvest handling practices required for the particular market. This is, of course, the economic way of doing business. If they were to apply all the recommended postharvest practices, their operational costs would soon increase to the point where they would be forced out of business. Since most of the extra-regional exports are destined to ethnic markets in the UK or Canada, the present demand for postharvest treatments is reduced since these consumers are willing to accept fruit with an appearance that the North American/European populations would consider below standards. Consequently the exporter is able to keep his investments in infrastructure and expensive equipment at the minimum.

In some cases, importers in the UK and Canada suggest ways of extending shelflife or improving fruit presentation. For example, breadfruit is placed in individual plastic bags or, in the case of MNIB Grenada, shrink-wrapped. In St. Vincent, breadfruit is pre-cooled in ice water and ice is placed in each plastic bag (Table C-1). These methods extend the short shelf-life of breadfruit and confine deterioration to individual fruits.

Mangoes are pre-ripened with ethylene gas (same process as used for bananas for domestic consumption) in St. Lucia (SFAD) to bring out the colour and to detect bruised fruit prior to air shipment. In Dominica, FIM reports that washing mangoes in sea water tends to improve the colour. Plantain, mango and golden apple are sometimes dipped in a fungicide bath and air dried. Mango, avocado and soursop are shipped in cardboard boxes with divisions (Table C-1).

Exporters are aware of demand conditions in their respective markets. These tend to be communicated on a regular basis from their representatives (importers) in the importing countries. They do their best to

meet these conditions as they are aware that failure to do so will cause them to lose the market.

The more sophisticated the demand the closer the supervision provided by the exporters. Exporters are aware of the need for careful harvesting and they attempt to overcome this constraint by either supervising harvest with trusted pickers or by dealing only with farmers who, over time, have shown their ability to provide quality fruit. This is not to say that assembly of quality produce is not a problem. It is. However, much of this problem is a result of the fruit being scattered in small amounts throughout the islands. This problem, therefore, is more one of faulty production planning than one of lack of infrastructure.

The argument that farmers and exporters do not use modern techniques simply because they do not know the "proper way" to harvest and handle in the postharvest stage is probably more myth than anything else. From their experience they have been adopting new methods when required to earn a buck. Training in "new methods" which add cost but show no increased economic returns will not be adopted. Training is necessary but only makes sense when linked to development programmes which increase returns in excess of the additional costs brought about by introducing new, improved techniques.

3.2 Postharvest Handling Infrastructure

The banana industry, over the past few years, has been transformed from a situation of much infrastructure, for washing and packing of fruit, to one of field packing and, therefore, minimal requirements in packing facilities. Bananas are harvested and packed in the field and taken directly to the wharf (via assembly centres for small producers) for loading on to refrigerated ships. The cooling chain only begins onboard ship. This transformation has resulted in the underutilization of 8 IBD (inland buying depots) in Grenada, 13 each in Dominica and St. Lucia and 15 in St. Vincent (Table C-2).

Other than the IBD, relatively little infrastructure is available (and is perhaps unnecessary) in the four Islands for the postharvest handling of perishable produce. The international airport in Grenada has 2 unused chill units and 4 unused freezer units (Table C-2). The seaport in St. Lucia has 68,000 cubic feet of usable freezing space. This facility has been leased to a foreign fishing company and is in full operation. All four of the marketing institutions have chill units. All of these are in operation, except for the 5 units in Dominica. All are in need of repairs and maintenance. DEXIA in Dominica has 2 freezer units, presently out of operation, and SVGMC in St. Vincent has 3 freezer units, in operation.

The existing exporters have very simple infrastructure, varying from nothing (in-field packing) to assembly centers with simple buildings (often rented) with a few wooden packing tables and one or more cement wash tanks. For the near future, improved versions of these will probably suffice, until volumes of produce warrant more sophisticated facilities.

All four of the islands have been improving their road networks since the debilitating hurricanes of 1979/80. While the primary roads are generally in good condition in the four Islands, with the possible exception of Grenada, feeder roads and access roads are in need of improvement, particularly the latter (Table C-2).

Only St. Lucia and Grenada have international airports and both of these are in excellent condition. Hewanorra airport in St. Lucia has no storage area for perishable produce.

The SFAD project in St. Lucia has constructed one rural assembly centre and has a second one planned as part of its export programme. Crucial questions need to be asked concerning the criteria for site selection, needs for basic capital intensive infrastructure and participation of farmers organisations.

All four Islands offer inadequate or no basic infrastructure to facilitate the Huckster/Trafficker trade at wharfside. These facilities are non-existent in St. Lucia and St. Vincent. In the former case the packing is done on the edge of the public marketplace and in the latter instance the packing/temporary storage functions take place in the streets adjacent to the wharf. In Dominica and Grenada the existing facilities are inadequate to meet the needs of these traditional traders for space, convenience and control of exports.

In St. Vincent there is a project in-pipeline to build a temporary storage facility in the wharf area next to the Marketing Corporation. The proposal concentrates on infrastructure and equipment, however, and does not provide a realistic proposal for operation. For example, how do you get several hundred Traffickers to accept and work within a system which may be to their disadvantage? Since they do not want to have their volume of produce accurately quantified, they are likely to work against any new system. Another weakness of the proposal is that the system will be dependent upon forklifts to store produce at different heights, thus maximizing the use of space. This system works well for supermarket chains and other developed systems for handling standard size palletized containers. It is unlikely to work well for the Trafficker trade.

Another project which deals with wharfside storage/handling infrastructure is the FAO "Reduction of postharvest losses of fruits and vegetables entering inter-island trade" project. This project is presently being implemented and will be an integral part of any strategy to develop intra-regional marketing within this Sub-region. Under the FAO project, a design of huckster packing facilities has been integrated into the public marketplace renovation project.

Packing sheds and cool storage facilities should be constructed in function of specific needs and with specific commodities in mind. Too often the infrastructure is built first, before it is known exactly how it will be used.

3.3 Recommended Postharvest Handling Conditions

Once a product is harvested nothing can be done to improve upon its quality. However, many things can be done to maintain the quality existing at the time of harvest. When a product is harvested at the optimum point in its life cycle, and stored under the recommended temperature and humidity levels, it is less likely to suffer disease problems and more likely to reach its optimum shelf life. Maintenance of product quality may, however, have a high cost.

Table C-3 was constructed from existing literature and interviews with specialists, with the intention of providing some guidelines, for recommended postharvest handling of selected fruits. It indicates recommended storage and ripening temperatures, relative humidity, shelf life, principal postharvest diseases, special postharvest requirements and alternative uses for agro-processing for each fruit.

Although shelflife can be extended with refrigeration, conditions do not always warrant the investment. For example, one of the fruits with the shortest shelflife is banana, however, the cool storage chain for banana in the Windward Islands does not begin until this product is aboard ship. This is feasible in the case of bananas since the commodity is harvested in the green state. At any rate, the postharvest handling of bananas may well serve as a good indicator for determining what to do, or not to do, in the case of other fruits.

The shelflife of many tropical fruits may be shortened because of disease and pest problems. Effective chemical and hot water bath treatments have been developed in other countries and can be adapted to the Windward Islands, with a minimum of training and at relatively low costs.

Table C-1: Commodities Receiving Specialized Pre and/or Postharvest Handling
in Preparation for Export, by Country

Pre/Postharvest handling practices	Dominica	Grenada	St. Lucia	St. Vincent
Determine maturity	banana, plantain	banana	banana, plantain	banana
Cut and Trim	banana, plantain	banana	banana	banana, plantain
Control latex	banana	banana	banana	banana
Select/Grade:				
- on farm	banana	banana	banana	banana
- assembly centre	banana	banana	banana	banana, avocado
- both places	grapefruit	breadfruit	mango, breadfruit, avocado, citrus	soursop, breadfruit, mango, plantain, golden apple
Fungicide treatment:				
- pads	banana	banana	banana	banana
- spray	grapefruit			
- dip	plantain			mango, golden apple, plantain
Transport from farm:				
- field crates	grapefruit	breadfruit		
- cardboard box	banana, plantain	banana	banana plantain	banana plantain other fruit
- stem				
- plastic sacks				
- refriger. truck		breadfruit		
- loose with padding			mango, bfruit, citrus	
Degreening	grapefruit			
Washing:				
- clear water	orange, pawpaw, watermelon		bfruit, citrus	mango
- water/alum			mango	
- water/clorox		breadfruit		
- sea water	mango			
- ice water				breadfruit
- wiped damp cloth			avocadoes	
- rubbed wet cloth			citrus	
Drying:				
- mechanical	grapefruit			
- air dried	all other produce	all produce	all produce	all produce
PMC pack line:				
select/spray wash				
benlate/dry/wax/pack	grapefruit			
Pre-ripening			mango	

continuation of Table C-1

Pre/Postharvest handling practices	Dominica	Grenada	St. Lucia	St. Vincent
Type cardboard box:				
- no divisions	grapefruit		mango, bfruit, citrus	plantain, golden apple
- with divisions			avocado, mango	mango, avocado, soursop
- plastic liner	banana	banana	banana	banana
- plastic bags			breadfruit	
- bags with ice				breadfruit
- fruits shrinkwrapped		breadfruit		
Inspection & control (1)				
	grapefruit, banana	banana	banana	banana
Pre-cooling				
		bfruit(chillroom)		breadfruit (ice)
On-ship cooling (2)				
- Geest	banana, grapefruit, others	banana, others	banana, others	banana, others
- PTM	fruits/veg/roots & miscellaneous			

Source: IICA research

- (1) Inspection/control by other than owners of produce to assure quality and maintenance of standards. Most exporters do some inspection/control of their own but the standards are not consistent.
- (2) Produce shipped by Hucksters is not cooled. Geest and PTM operate refrigerated ships. Most other extra-regional shipments are made by air freight without cooling other than that occurring naturally at 20,000 feet elevation.

Table C-2: Characteristics of Selected Infrastructure Required for Postharvest Handling of Fresh Produce by Country, 1986

Type of infrastructure	Dominica	Grenada	St. Lucia	St. Vincent
Road condition:				
- primary roads	good/asphalt	ok-good/asphalt	ok-good/asphalt	good/asphalt
- feeder roads	good - poor oil/tar/cut	ok-good/asphalt	ok-poor/asphalt	ok-good/gravel/asphalt
- access roads	ok - poor cut/tarish	poor/gravel	ok-poor/gravel	ok-dirt/gravel
No. banana boxing plants (IBD)	13	8(1)	13	15
Cold Storage:				
Airports:				
- # chill units	0	2	0	0
- total capacity(2)	0	1350	0	0
- condition	-	new	-	-
- # freezer units	0	4	0	0
- total capacity(2)	0	2250	0	0
- condition	-	new	-	-
Seaports:				
- # chill units	0	0	0	0
- total capacity	0	0	0	0
- condition	-	-	-	-
- # freezer units	0	0	4 (3)	0
- total capacity	0	0	68,000(4)	0
- condition	-	-	ok	-
Marketing Boards				
- # chill units	5	2	2	4
- # in operation	1	2	2	4
- total capacity(2)	4000	3371	3400	2520
- condition	need repairs	need maintenance	need maintenance	need maintenance
- # freezer units	2	0	0	3
- # in operation	1	0	0	3
- total capacity(2)	1490 cf	-	-	3060 cf
- condition	need repairs	-	-	needs maintenance
Number airports:				
- regional flights	2	1(5)	2	1
- extraregional	0	1	1	0

Source: IICA research, 1987 (1) Six are GBCS and two are private. (2) Cubic feet of usable space = 75% of total area. (3)Originally were 6 units. (4) Cubic feet of usable space = 85% of total area. (5)Pearl airport no longer in use.

Table C-3: Harvest Indices and Recommended Postharvest Handling Conditions (1) for Selected Fruit Crops

CROP	FRUIT CONDITION AT HARVEST	BEST STORAGE TEMP. (F) Range	LOWEST SAFE TEMP. (F)	BEST RIPENING TEMP. (F)	RELATIVE HUMIDITY %	DAYS SHLEF LIFE WITH REF.	AMBI-ENT	PRINCIPAL POSTHARVEST DISEASES	SPECIAL POSTHARVEST REQUIREMENTS (wash, wax, wrap, ethylene, fungicide, package)	AGRO-INDUSTRIAL ALTERNATIVES
Mangoes	-mature green	55	50-55	70-75	85-90	14-21	5-8	-anthracnose -dipladia stem end rot -internal end breakdown	-hot water bath	-slices in brine -juices -jams
Avocados	-colour change to pale green or purple -mature size -minimum oil content	40-55	40-55	60-75	85-90	14-30	5-8	-anthracnose -phytophthora	-hot water bath	-guacamole dip
Oranges	-colour -brix/acidity	32-44	32		85-90	45-90	6-8	-stem-end rot -bluegreen mold -brown rot	-chemical treatments -wash sooty mold	-juices -segments -marmalades
Grapefruit	-Marsh: lose bright colour Ruby Red: increased blush	50-60	50		85-90	30-45	6-10	-same as orange	-same as orange	-same as orange
Limes	-skin green, smooth, round	48-50	45		85-90	45-60	4-6	-stylar-end breakdown -blue mold		-juice concentrate -marmalade
Breadfruit	-near mature or mature -skin smoother & less green	55	54		95	7-14	3-5	-soft rot	-pre-cooling & individual wrapping to control ethylene gas & deterioration of neighbouring fruit	-chips
Plantains (2)	-mature finger development	55-58	54	58-68	90-95		1-3 3-10	-anthracnose -crown rot	-chemical treatments	-chips
Passion fruit(3)	-fruit falls to ground						4-6	-brown rot -blue mold		-juice concentrate
Paw paw	-colour break to 1/4 (yellow stripe)	45-50	45	70-80	85-90	7-21	2-8	-anthracnose	-hot water bath -vapor heat -benlate dip	-crystal candy juice, papain preserves
Bananas	-fingers 3/4 developed -green	55	54	59-64	90-95	5-20	2-7	-anthracnose -crown rot	-chemical treatments	-dried fruit -chutney, chips -jam, spread -vinegar, wine

Source: USDA Agricultural Handbook # 6, The Commercial Storage of Fruits, Vegetables and Florist and Nursery Stocks.

TORI (P. Proctor, et.al.) Postharvest Technology of Commercial Perishable Crops - A Short Course held in St. Lucia.

Interviews with specialists.

(1) The optimum temperatures will sometimes vary with the cultivars.

(2) Shelflife for green (1-3) and yellow(3-10).

(3) Passion fruit for processing.

4. DOMESTIC MARKETING

4.1 Population and Tourism Trends

The total population of the four Windward Islands is less than 430,000 people, ranging from 84,000 in Dominica to 137,000 in St. Lucia, in 1985 (Table D-1). The annual population growth rate over the ten year period 1976-1985 averaged from 0.23 in Grenada to 1.21 in St. Lucia. The population living in or around the capital city in each country ranges between 20% in Dominica to 38% in St. Lucia. From the above, and assuming no dramatic redistribution of income and/or no rapid increase in economic growth, it can be concluded that the domestic demand for fresh produce, including fruits, is likely to grow very slowly. Not only is the population small but it is quite rural, and given the common practice of backyard orchards, much of the increase in domestic demand will be satisfied with home production.

Number of visitors, by sea and by air but excluding cruise ships, has increased by 84% over the past 10 years, from 132,513 in 1976 to 243,642 in 1985. These visitors were distributed between the Islands (1985) as follows: Dominica 16%, Grenada 22%, St. Lucia 39% and St. Vincent 23%. Cruise ship calls are on the increase in all the Islands with the exception of Dominica. In 1987, number of cruise ship calls are expected to reach 200 in St. Vincent, 230 in St. Lucia and 257 in Grenada. Only 19 are expected in Dominica. Total number of beds at hotels, guest houses and cottages in the Sub-region in 1985 were estimated at 6,743. Of these, 60% were in St. Lucia, 20% in Grenada, 14% in St. Vincent and 6% in Dominica.

Much of the fruit, fruit juices and preserves, jams, etc. served in the hotels continue to be imported. Relatively small amounts of fresh produce are presently being sold to the cruise ships. It would appear that significant growth potential exists for supplying the tourist sector with fresh and processed fruits.

An analysis of the demand of the hotels and cruise ships should be carried out in combination with an analysis of the Sub-regions's potential to meet the demand. Due to the difference in seasons (some commodities) between islands it makes sense to supply some hotels St. Lucia, with produce from other islands, e.g. citrus from Dominica. In fact, this was done in 1986 when STAFCOOP imported citrus from Dominica through FIM for Club Med in St. Lucia.

4.2 Potential for Import Substitution

Table D-2 shows the value of fruits and fruit products imported into the countries of the Windward Islands between 1975 and 1985. Total value of these imports to the Sub-region were EC\$5.3 million in 1985. Of this amount, St. Lucia imported 67%, St. Vincent 14%, Grenada 13% and Dominica 6%. Dominica imports have had some ups and downs reaching its highest level of fruit imports in 1980. Grenada peaked in 1981 and has leveled out around EC\$700,000 in recent years. St. Lucia also peaked in 1981 at EC\$4.3 million but has remained relatively steady around EC\$3.5 million during the four year period (1982-85). In 1985,

St. Vincent imported only 50% of the fruits and fruit products that it imported in 1980.

A breakdown of the types of fruit products imported in 1985 is presented in Table D-3. The principal fruit product imported is fruit juices, varying from 15% of Dominica imports to 64% (EC\$2.3 million) of the total value of imports into St. Lucia. The second category that offers scope for import substitution is that of fresh fruits, mainly temperate fruits. The value of this group of imports into the Sub-region reached EC\$749,734 in 1985. One of the reasons for these imports is often the lack of quality fresh fruits on the domestic markets. The third group which presents some potential for import substitution is that of fruit preserves and jams/jellies/marmalades. Sub-regional imports of these items only reached EC\$406,558 in 1985, however, even these amounts are significant for cottage industries.

4.3 Agro-processing

Agro-processing in the Windward Islands is relatively underdeveloped. Only Dominica has plant size operations with export capabilities. St. Lucia has one small plant size operation (Agro Industries Ltd.) but it has not operated since 1984. Table D-4 shows the volume of fruits processed in each of the four countries. Whereas Dominica processed 4,469 tonnes in 1985, the other three countries only processed 78 tonnes between them. Some 95% of the fruits processed in Dominica in 1985 were citrus (grapefruit and lime). Only Dominica is exporting processed fruits, including grapefruit segments, lime oil and passion fruit concentrate. In 1984, Agro Industries Ltd. exported 54 tonnes of sliced mangoes in brine from St. Lucia.

In addition to the few firms which process the bulk of the fresh produce, each Island has between 15 and 30 home and small cottage industries which produce a wide variety of products (Table D-5). These include candy, nectar, syrups, marmalades, jellies, jams, preserves, chutney, chips and others. In nearly all cases production takes place with minimum facilities, often home appliances, and in an ad hoc and sporadic manner. Of these firms, the better organized are Orange Hill in St. Vincent and Aunt Lucie's in St. Lucia. In all cases the main constraints include the lack of and high cost of containers, variation in quality and the lack of standardization and markets for output.

Each of the four Islands has a Produce Chemists Laboratory within the structure of its' Ministry of Agriculture. The most dynamic of these is found in Grenada. Those in Dominica and St. Lucia provide some useful services while that in St. Vincent was closed in 1984. * Nearly all of these PCL conducted the same "experiments" and developed the same types of products which were then offered to the private sector for commercial production. The procedure followed was to develop recipes, transfer the technology interested partys and then look for markets for the output. At the present time, given the limited domestic demand and the lack of export quality products, the agro-processing sub-sector is in a

* There is some talk about reopening in 1987.

state of uncertainty and, with the exception of Dominica, Government policies are unclear as to what should be done and how to go about doing it.

Some alternatives being considered include:

- 1) Identify export alternatives and develop local production and industrial capacity to produce a continuous supply of quality product for the market identified.
- 2) Determine the demands of the tourist industry for processed fruits and systematically develop the home and cottage industries to meet that demand (both import substitution and new market development).
- 3) Identify processed products for which the cottage industries have comparative advantage, e.g. banana chutney, and systematically develop the market and production capability.

Table D-1: Population and Number of Tourists by Means of Transportation and by Country, 1976 & 1985

Characteristics	Dominica	Grenada	St. Lucia	St. Vincent
Population:				
- 1976	79422	94000	112913	98980
- 1985	84000	96000	136952	110000
- annual rate of growth	0.62(1)	0.23	1.21	1.18
- % total population living capital	20	25	38	26
Visitors:				
1976				
- by sea (2)	4626	1695	2614	1456
- by air	28263	22856	53826	17177
- total	32889	24551	56440	18633
1985				
- by sea (2)	6103	2821	1311	3987
- by air	33112	49158	94454	52696
- total	39215	51979	95765	56683
Increase over 10 years (%)	19	112	70	204
Total # cruise ship calls:				
- 1985	22	173	126	86
- 1986	19	223	153	123
- 1987 (3)	19	257	230	200
Total # beds:				
- hotels (1986)	380	1343	4033	987
- guest houses	-266	-882	3500	-471
- others	-114	-221	179	-108
	-	-240	354	-408

Source: Official statistics and IICA research/calculations

(1) Net decrease in population of 8741 persons in 1979, after Hurricane David.

(2) Does not include cruise ships

(3) Programmed

Table D-2: Value (EC\$ 000) of Imports of Fruits and Fruit Products by Country, 1975-1985

Countries	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Dominica	212	162	174	344	240	382	182	289	168	261	318
Grenada	377	216	420	686	729	878	1075	960	737	625	700 (1)
St. Lucia	674	968	1581	2016	2794	4076	4316	3635	3206	3526	3603
St. Vincent						1416					720
Total Sub-region						6752					5361

Source: Official statistics
(1) Estimate by authors

Table D-3: Value (EC\$) of Imports of Fresh Fruits and Fruit Products by Type Product and by Country, 1985

Fruit Product Imported	Dominica		Grenada (1)		St. Lucia		St. Vincent												
	EC\$	%	EC\$	%	EC\$	%	EC\$	%											
Fresh fruits	1038	<1	>		69216	2	87	0											
			>	109364	18														
Temperate fruits	10500	3	>		432355	12	127174	18											
Fruit juices	49139	15		288614	46	2289528	64	352014	49										
Frozen fruits	0	-		8118	1	0	-	0	-										
Preserved fruits	6639	2		66124	11	83986	2	63796	9										
Jellies/marmalades	7786	2		21927	4	113613	3	42687	6										
Dried fruits	53056	17		65837	11	63824	2	66281	9										
Other forms fruit & nuts	190074	60		64574	10	550885	15	67563	9										
Total				318286	100			624558	100					3603407	100			719602	100

Source: Official trade statistics
(1) Grenada imports 1984

Table D-4: Quantity (tonnes) of Fruits Processed by Agro-industries (1) by Species and by Country, 1985

Products	Dominica	Grenada (2)	St. Lucia	St. Vincent
Mangoes	0	2	6	3 (3)
Avocados	0	0	0	0
Oranges	0	2	3	0
Grapefruit	2802	0	5	6 (3)
Limes	1441	0	<1	0
Breadfruit	0	0	<1	0
Plantain	2	0	1	4
Passion fruit	37	0	1	0
Paw Paw	46	4	<1	0
Sorrel	23	<1	0	0
Guava	13	2	2	0
Pineapple	0	0	3	0
Other fruits	11	2	3	0
Spices	80	20	2	<1
Vegetables	0	0	0	0
Others	14	3	<1	2
TOTAL	4469	35	27	16

Source: IICA research, 1986

- (1) Does not include coconut industries in the Windward Islands, nor spice industries in Grenada, except for cottage spice industries. Does not include imported concentrates which are mixed and sold on the local market.
- (2) These are estimates made by IICA researcher as no data was available on real amounts of fruit processed in 1985.
- (3) Orange Mill 1986 production.

Table D-5: Fruits used in Agro-processing (1) by Type Output and by Country

Type Output	Dominica	Grenada	St. Lucia	St. Vincent
Segments	grapefruit*			
Juices/concentrates	gfruit, lime, passion fruit*	sorrel	orange, gfruit, pineapple, sorrel	gfruit, passion fruit mango, lime, guava, sorrel
Oil	lime*			
Candy		pawpaw, condicion	pawpaw, mango, orange	
Slices in brine			mango(2)*	
Nectar			guava, tamarind	mango, guava
Syrups		grenadine, nutmeg, orange	tamarind, passion, lime, golden a., sorrel, guava	sorrel, nauby
Marmalade			orange, gfruit, lime	orange
Jelly	guava	guava	guava, orange	mango, guava, nutmeg, sorrel
Jam	guava	guava, nutmeg	guava, pineapple, mango	guava
Preserves			gooseberry	
Chutney		mango	mango, chutney, banana	mango
Chips	plantain, banana		plantain, breadfruit	plantain

Source: IICA research

(1) Most of the processed fruits are done on a small scale in cottage & home industries, the exceptions being mainly in Dominica where grapefruit segments & concentrates are exported.

(2) Sliced mangoes in brine were exported by Agro Industries Ltd. in 1984.

* Those commodities with an * are those which are exported, the other products are sold on the domestic markets.

5. EXPORTS FROM THE WINDWARD ISLANDS

5.1 Exports

Tables E-1 to E-8 present statistics on the exports of fresh produce and fruits from each of the Windward Islands during 1985. Additional statistics on imports and exports from each of the four countries are presented in Appendices 5 through 8.

Table E-1 presents an index of fresh produce exports by commodity group from 1975 to 1985, based on official data presented in Appendices 5-8. The first year in the series was given a value of 100. In the case of Dominica the indices for fruit and ground provisions in 1985 are below the 1975 levels while that for vegetables is above. In the case of Dominican fruit, 1976 shows the beginning of a fall in exports due to market conditions. Hurricanes hit Dominica in 1979 and 1980 and the decline in exports was severe (index drops to 33). After the hurricanes, exports start upwards in 1981 but by 1985 have only reached 67 on the index, an indication of continued serious market constraints.

In the case of Grenada, fruit exports have tended upwards since 1978, with declines in 1980 and 1982. Very heavy increases in the exports from Grenada in 1983 and 1984 raises the question of information validity. This coincides with the period of declining value of the Trinidad dollar and, as will be explained below, there is a tendency on the part of hucksters to overstate the volumes being exported.

St Lucia fruit exports have been up and down since 1975. As recent as 1983 St. Lucia fruit exports were below their 1975 level. In 1985, exports of vegetables and ground provisions continued to be way below the 1975 level. Fresh fruit exports have increased in 1984 and 1985, due mainly to increased volumes of breadfruit shipments.

Exports of fruit from St. Vincent remained fairly level until 1984 when they doubled. Since fresh coconut exports were on the decline during the period 1979-85, if we remove them from the index there is even a more spectacular increase in the years 1984 and 1985. In the case of ground provisions (the major export group), the jump in 1984 and 1985 is greater still. Since nearly all the fresh produce from St. Vincent is exported to Trinidad, and since in 1984 it became increasingly difficult to get foreign currency from the Trinidad/Tobago Central Bank, there appears to be a tendency for the hucksters/traffickers to overstate their exports. This leads to inflated official statistics.

In Table E-2, 1985 exports are compared with an 11 year average, by commodity and by country. In all four countries 1985 exports of mangoes, avocados, breadfruit, plantains and non UK bananas were above the respective averages. Grapefruit and orange exports were above the respective averages in Dominica and St. Lucia. The two commodities which were consistently below the respective averages were limes (with the exception of St. Vincent) and fresh coconut exports.

Fresh produce (fruits, vegetables, roots, etc.) exports from the four Islands in 1985 are shown by commodity in Table E-3. These range from a low of 2,464 tonnes from St. Lucia to a high of 48,818 tonnes from St.

Vincent (1), with Dominica exporting 5,562 tonnes and Grenada 6,065 tonnes. When UK bananas are included, the non-banana fresh produce exports become relatively insignificant in the case of St. Lucia (3%), more significant in Dominica (14%) and highly significant in Grenada (43%) and St. Vincent (55%). With the exclusion of UK bananas, fresh fruit exports represented 88% of fresh produce exports in Dominica, 97% in Grenada, 89% in St. Lucia, but only 16% in St. Vincent. As to the types of commodities exported, 67% of fruit exports in Dominica were citrus. In Grenada, 38% of fruit exports were non UK bananas and plantain while 16% were soursop, 13% golden apples (2), and 10% each were mangoes and avocados. In St. Lucia, breadfruit represented 41%, plantain 20% and non-UK bananas 13%. In St. Vincent, 39% were plantains, 11% each were avocados and golden apples (2), 10% coconuts and 9% mangoes.

Table E-4 reports the destinations of fresh produce exports by country. Between 89% and 99% of the fresh produce exports from Dominica, Grenada and St. Vincent were destined for regional markets. In the case of St. Lucia, only 23% was destined to the regional market. The remaining 77% was sent to the UK (86%), Canada (13%) and the USA (1%) In the case of Dominica, 100% of extra-regional exports of fresh produce, in 1985, went to the UK. St. Vincent sent 59% of its extra-regional exports to the UK, 24% to Canada and 17% to the USA. Grenada only exported 13 tonnes to extra-regional markets in 1985 and this consisted of trial shipments (13 tonnes) of breadfruit to Miami. Table E-5 presents the same type of data but in this case for fresh fruit only (UK bananas were excluded in both cases). In the case of fresh fruits, the same relationships hold as was mentioned for fresh produce in general.

As to regional destinations of fresh fruit from Dominica, the French Departments of Guadeloupe and Martinique are the principal destinations, followed by Antigua and Barbados. All of Grenada's regional exports go to Trinidad as do 93% of the regional exports from St. Vincent. St. Lucia, in 1985, sent 72% of its regional exports to Barbados and 18% to the Virgin Islands (Table E-5).

Total exports of fresh fruits (excluding UK bananas) from the Sub-region, in 1985, was 20,852 tonnes (3), of which 86% went to regional markets and 14% to extra-regional markets, mainly the UK (Table E-6). In respect to commodities, plantain accounted for 27% of these exports, non-UK banana 13%, grapefruit 12%, mango 9%, avocado and golden apples (2) 8% each, breadfruit and soursop 5% each. The remaining 13% included, orange, lime, coconut and miscellaneous other fruits.

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- 1) The official statistics from St. Vincent may be inflated by as much as 100% or more in 1985.
 - 2) Includes golden apples, sugar apples and other local fruits of this same type.
 - 3) This amount may be over estimated by some 4,000 tonnes due to over statements in official statistics in St. Vincent.

As to the distribution of the fruit by destination (Table E-7), in 1985, 92% of the breadfruit and 47% of the coconuts went to extra-regional markets. The bulk of the other fruits were marketed within the region.

5.2 Exporters

Six distinct types of exporters can be identified in the Windward Islands. Each of these is briefly described below:

- a) **Marketing Boards or Corporations:** Institutions representing the public sector and having direct involvement in the marketing of agricultural produce. They have existed in each of the Windward Islands since the sixties. In 1985 they were all in operation, with the exception of Dominica, where the Marketing Board was being reorganized.
- b) **Farmers Organizations:** There are two types of farmers organizations involved in export. The more significant are the traditional commodity associations which are the principal exporters of banana, cocoa, nutmeg and arrowroot. The second group of farmers organizations involved in export are of recent origin and are made up of small farmers interested in the export of non-traditional agricultural produce. The volumes of produce handled by this latter group are relatively small, but significant in some cases, considering the magnitude of the problem and the limited resources at their disposal.
- c) **Hucksters/Traffickers:** This group is the oldest and the most numerous. Their number within the Sub-region has been estimated as high as 1,000. While they market relatively small volumes of produce individually, as a group the total volume of produce handled is very large. They tend to market within the region, using mainly the traditional non-refrigerated schooners for inter-island transportation. They are very active in a two-way trade and often make their greatest income on the return trip, retailing dry goods to friends and neighbours.
- d) **Recent Exporters:** This group tends to be more oriented towards extra-regional markets. Most have close friends or family managing their operations on the import side. Their capital investment, although small, is much greater than that of the Trafficker/huckster. They are relatively few in number, varying from none in Grenada to as many as 8 in St. Lucia. Most of their shipments are made by air freight. The volumes handled may vary from a few tonnes to several hundred, in at least one instance.
- e) **WINBAN:** The Windward Islands Banana Growers Association is the central coordinating and negotiating body for the marketing of Windward Island bananas to the UK.
- f) **CATCO:** Marketing subsidiary of the Caribbean Food Corporation. It is a regional trading company presently operating out of Barbados.

Table E-8 presents the exports of fresh produce (excluding UK bananas) from the Sub-region by Type of exporter (excluding WINBAN and CATCO) and country of origin. The huckster/trafficker can be seen to be the principal exporter with 21% of the volume in St. Lucia, 79% in Dominica, 97% in St. Vincent and 99% in Grenada. The non-traditional farmers organizations are second in volume of produce handled, principally COGA and FTM in Dominica. Third is the group called "recent exporters". Within this group, the bulk of the exports are carried out by one firm in St. Vincent (ECA) and four firms in St. Lucia. Marketing boards, in 1985, exported less than 440 tonnes of fresh produce, thus putting them in the position of least importance, in terms of volume of exports.

CATCO exported 292 tonnes of fresh produce from the region during their 1985/86 financial year. Of this amount, 38% came from the Sub-region (St. Vincent and St. Lucia).

5.3 Transportation Alternatives

Table E-9 presents the principal transportation alternatives from the Sub-region, by air and by sea. It must be recognized that airline schedules are very dynamic, changing with the tourist season and with the opening of new airports and routing changes of the diverse carriers. Likewise, sealines will periodically adjust their schedules according to demand. Therefore, the information presented in Table E-9 should be taken only as an indication of what the situation was like in February, 1987 and not necessarily what it is today. Another limiting factor of this Table is that it does not identify all the sealines which have the potential to carry fresh produce in refrigerated containers and would be willing to stop at the ports, if sufficient volumes were available.

As can be noted (Table E-9), extra-regional airline service is only available out of St. Lucia, and to a much lesser degree Grenada. Unused cargo capacity is presently available from both St. Lucia and Grenada to the USA market, however, as was seen in the previous Tables, relatively small volumes of fresh produce from the Sub-region is destined to the USA market (less than 260 tonnes in 1985). This is a result of quarantine restrictions as well as difficulties in meeting quality standards and price competition. In addition, West Indians have closer links with both the UK and Canada and it is easier for them to find individuals there who will "protect their interests" on the import side.

In the case of flights to the UK, the situation is quite different. There are fewer flights to the UK than to the USA and much more competition for the airspace. Not only is there competition between exporters in the same country for space on the UK destined flights but there is also competition between the islands and with Venezuela. For example, both St. Vincent and St. Lucia shuttle fresh produce to Barbados where it competes with fresh produce from that country for space on the flights to the UK. The British Airline flight which provides weekly service from St. Lucia to the UK originates in Venezuela. Most of its 20 tonnes of cargo capacity is utilized for Venezuela cargo since not only is more cargo readily available but the freight rates paid in

Venezuela are much higher than the preferential rates paid out of St. Lucia. In recent months exporters have pointed out that available space is limiting volumes of exports from both St. Lucia and St. Vincent and, with the best of coordination between shippers and airlines, produce sometimes gets left on the tree, and occasionally on the tarmac.

In the case of St. Vincent, both Liat and Caricargo are used for shuttling produce to Barbados and sometimes to Hewanorra in St. Lucia, to meet the extra-regional flights. In the case of Dominica, very little fresh produce is shipped by air.

In respect to shipments made by sea, the largest volumes of non-banana fresh produce exports are marketed within the region. These exports are made by the trafficker/huckster aboard the traditional non-refrigerated schooners. Although there are between 20 and 30 of these schooners servicing each of the Windward Islands, only between 4 and 8 of them handle mainly fresh agricultural produce. Other regional shipping is carried out by Farm-to-Market, out of Dominica, which operates the only refrigerated vessel for intra-regional trade.

As for extra-regional shipping by sea, Geest Industries is the principal carrier of fresh produce, with bananas being the main cargo and the UK being the final destination. Smaller volumes of a variety of fresh produce are also carried. While exporters complain of high transport costs and difficulty in obtaining space, Geest officials claim they are competitive and can make the space available when given "proper" advanced notice. What is considered proper advanced notice by Geest, however, is considered too long a period for the shippers, who often are unsure of the volumes to be shipped until a few days prior to shipment. As a result, exporters tend to prefer making their shipments by air.

Another shipping company, Tropical, offers weekly service between West Palm Beach, Florida and St. Lucia. It offers no inter-island service although connections can be made, with good coordination with Geest. Tropical is basically a one-way shipper as most of its containers return to Florida empty. In 1985, for example, of 2,756 containers loaded out of Port Castries, 97% were empty.

Trailer Marine Transport (TMT) is a principal competitor of Tropical. It provides weekly service between San Juan, Puerto Rico and Trinidad, stopping at most of the Islands. It's service includes refrigerated 40 foot containers with roll-on roll-off (RORO) service. One disadvantage of this service is its indirect nature. With transshipments out of San Juan, transit time from the Windwards to USA ports may exceed one week.

Table B-1: Index of Volume of Exports of Fresh Produce by Country Commodity Group and by Years (1975-1985)

Country: Commodity group	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Dominica:											
- fruits	100	84	80	91	42	33	38	56	61	65	67
- vegetables	100	107	213	198	71	75	95	129	204	174	123
- g.provisions	100	102	96	81	37	30	62	58	100	126	85
Grenada:											
- fruits (1)				100	226	150	190	137	385	548	556
- vegetables				100	55	38	36	2	28	14	111
- g.provisions				100	100	73	105	58	212	187	64
St. Lucia:											
- fruits	100	99	60	132	111	83	70	65	63	111	141
- vegetables	100	172	106	84	24	9	9	11	10	4	25
- g.provisions	100	77	74	45	30	31	28	15	20	29	46
St. Vincent:											
- fruits (with coconuts) (2)					100	93	101	96	88	219	237
- fruits (without coconuts) (3)					100	89	171	171	167	372	477
- vegetables					100	80	84	113	39	56	65
- g.provisions (3)					100	120	171	199	325	675	996

Source: IICA/MOA Country Baseline Information documents. Trade statistics appendices 5-8 of this report.

- (1) Very large jumps in indices in 1983, 1984 & 1985 may be a reflection of problems Traffickers have getting foreign exchange out of Trinidad. However, since the data for 1984 and 1985 are taken from estimates of exports made by the statistics section of the MOA, and based on observations during the loading of the schooners, they may be more accurate than official statistics based on declarations. The increase in exports do not necessarily mean that there has been an increase in production.
- (2) Index shows less change from year to year as declining coconut exports tend to offset the increase in exports of other fruits.
- (3) Big jumps in indices in 1984 and 1985 are thought to be more a result of over statements on customs declarations than of increases in actual production or exports. The over statements on customs declarations is linked to problem of getting foreign exchange out of Trinidad.

Table E-2: Exports of Fresh Produce (excluding UK bananas) in 1985 in comparison with 11 year (1975-1985) Average, tonnes

Commodity	Dominica		Grenada(1)		St. Lucia		St. Vincent(2)	
	Ave.	1985	Ave.	1985	Ave.	1985	Ave.	1985
Mangoes	128	178	420	567	304	369	408	780
Avocados	50	68	297	618	7	28	344	880
Grapefruit	2291	2387	n.a.	35	31	48	49	47
Oranges	448	641	n.a.	36	27	28	74	n.a.
Limes	264	239	64	52	12	1	38	77
Plantain	459	645	426	1077	208	445	1914	3510
Breadfruit	-	-	-	13	480	912	-	-
Bananas (nonUK)	(3)	(3)	339	1162	98	285	125	599
Coconuts	(3)	(3)	154	4	315	2	1166	809
Other fruit	1132	738	1306	2331(4)	8	28	299	962(5)
Vegetables	184	167	31	71	81	40	133	113
Ground prov.	466	499	154	98	113	115	15752	42456

Source: Calculated from the official trade statistics presented in Appendices 5 to 8.

- (1) Eight year average 1978-1985
- (2) Seven year average 1979-1985
- (3) Other fruit includes non UK bananas & coconuts
- (4) Mainly soursop, golden and other apples, sapodilla, plums, pawpaw & tamarind.
- (5) Mainly golden apple

Table E-3: Fresh Produce Exports from the Windward Islands by Commodity and Country of Origin, 1985, tonnes & %

Commodity	Dominica(a)		Grenada(b)		St. Lucia(c)		St. Vincent(d)	
	tonnes	%	tonnes	%	tonnes	%	tonnes	%
Mangoes	178	4	567	10	369	17	704	9
Avocados	68	1	618	10	28	1	854	11
Oranges	641	13	36	<1	28	1	62	<1
Grapefruit	2387	49	35	<1	48	2	43	<1
Limes	239	5	52	<1	1	0	66	<1
Breadfruit	(1)		13	<1	912	41	94	1
Plantains	645	13	1077	18	445	20	3108	39
Bananas:								
(non-UK)	(1)		1162	20	285	13	579	7
Soursop	(1)		914	16	43	2	34	<1
Golden/sugar								
apples			762	13	0	0	900	11
Sapodilla	-	-	181	3	0	0	-	-
Plums	-	-	158	3	0	0	-	-
Paw paw	-	-	97	2	0	0	-	-
Tamarind	-	-	95	2	0	0	-	-
Coconuts	(1)		4	<1	12	<1	832	10
Other fruit	738	15	125	2	28	1	740	9
Sub-total fruit	4896	88	5896	97	2199	89	8016	16
Vegetables	167	3	71	1	40	2	227	<1
Ground prov.	499	9	98	2	115	5	40247	82
Ginger	(1)		-	-	110	4	302	1
Others	-	-	-	-	0	0	26	<1
Sub-Total fresh produce	5562	100	6065	100	2464	100	48818	100
UK Bananas	33963	100	8007	100	81986	100	40078	100
TOTAL EXPORTS	39525	100	14072	100	84450	100	88896	100
Fresh produce (excluding UK banana) as % of total	14		43		3		55	

Source: (a) Central Statistics. (b) Statistical Unit, Ministry of Agriculture (c) Statistical Unit, Ministry of Agriculture (d) CARDI document: St. Vincent: A market profile, Kingstown, St. Vincent, 1986
 (1) Included in other fruit.

Table E-4: Fresh Produce Exports (excluding UK bananas) from the Sub-Region by Destination and Country of Origin, tonnes and %, 1985

Destination	Dominica(a)		Grenada(b)		St. Lucia(c)		St. Vincent(d)	
	tonnes	%	tonnes	%	tonnes	%	tonnes	%
Regional:								
- Antigua/B	644(2)	13	0	0	1	<1	(1)	
- Barbados	525	11	(1)	0	412	72	624	1
- Guad/Mart.	2509(3)	51	0	0	2	<1	7	<1
- Neth. Ant.	415(2)	8	0	0	0	0	0	0
- St. K/M/A	59	1	0	0	0	0	(1)	
- St. Martin	-	-	0	0	4	<1	(1)	
- Trinidad/T	239(2)	5	6052	100	50	9	48733	99
- Virgin Is.	180	4	0	0	105	18	(1)	
- Others	378	8	0	0	0	0	50(4)	<1
Total Region	4949	89	6052	99.8	574	23	49414	97
Extra-regional:								
- UK	614	100	0	0	1636	86	769	59
- Other Europe	0	0	0	0	0	0	0	0
- Canada	0	0	0	0	236	13	311	24
- USA	<1	0	13	100	22	1	222	17
Total Extra-region	614	11	13	0.2	1894	77	1302	3
GRAND TOTAL	5563	100	6065	100	2468	100	50716(5)	100

Source: (a) Central Statistics (b) Statistical Unit, Ministry of Agriculture
(c) Annual Overseas Trade of St. Lucia, Statistical Dept., Ministry of Finance, Planning and Statistics.

(d) Office of Statistics, Ministry of Finance, Planning and Development

- (1) Small amounts which were not been quantified.
(2) This is all fruit. Non-fruit shipments are included in others.
(3) Includes Guadeloupe and St. Marteen. Martinique is in others.
(4) Guyana, Leewards and Windwards.
(5) Total does not correspond to total in Table E-1 due to difference in source.

Table E-5: Fresh Fruit Exports (excluding UK bananas) from the Sub-Region by Destination and Country of Origin, tonnes and %, 1985

Destination	Dominica(a)		Grenada(b)		St. Lucia(c)		St. Vincent(d)	
	tonnes	%	tonnes	%	tonnes	%	tonnes	%
Regional:								
- Antigua/B	644	15	0	0	1	<1	(2)	
- Barbados	512	12	0	0	412	72	475	7
- Guad/Mart.	2285(1)	53	0	0	2	<1	2	<1
- Neth. Ant.	415	10	0	0	0	0	0	0
- St. K/W/A	53	1	0	0	0	0	(2)	
- St. Martin	(1)		0	0	4	<1	(2)	
- Trinidad/T	239	6	5883	100	50	9	6698	93
- Virgin Is.	118	3	0	0	105	18	(2)	
- Others	31	<1	0	0	0	0	6	<1
Total Region	4297	88	5883	99.8	574	26	7181	93
Extra-regional:								
- UK	599	100	0	0	1434	88	465	84
- Other Europe	0	0	0	0	0	0	0	0
- Canada	0	0	0	0	190	12	86	16
- USA	0	0	13	100	1	<1	0	0
Total Extra-region	599	12	13	0.2	1625	74	551	7
GRAND TOTAL	4896	100	5896	100	2199	100	7732(3)	100

Source: (a) Central Statistics (b) Statistical Unit, Ministry of Agriculture
(c) Annual Overseas Trade of St. Lucia, Statistical Dept., Ministry of Finance, Planning and Statistics.

(d) Office of Statistics, Ministry of Finance, Planning and Development

(1) Includes Guadeloupe and St. Marteen. Martinique is included with others.

(2) Included in others

(3) Does not tally with Table E-1 due to difference in source.

Table E-6: Exports of Fresh Produce(excluding UK bananas) from the Windward Island Sub-Region by Commodity, Country and by Destination, tonnes, 1985

Commodity	TO REGIONAL DESTINATIONS FROM					TO EXTRA-REGIONAL DESTINATIONS FROM					TOTAL EXPORTS
	Dominica (a)	Grenada (b)	St. Lucia (c)	St. Vincent (d)	Sub Total	Dominica (a)	Grenada (b)	St. Lucia (c)	St. Vincent (d)	Sub Total	
Mangoes	171	567	2	632	1372	7	0	367	148	522	1894
Avocados	63	618	<1	876	1557	6	0	29	4	39	1596
Oranges	640	36	23	62	761	0	0	5	0	5	766
Grapefruit	1815	35	43	47	1940	572	0	5	0	577	2517
Limes	235	52	<1	77	364	5	0	<1	0	5	369
Breadfruit	0	0	71	0	71	0	13	847	94	954	1025
Plantains	642	1077	150	3505	5374	3	0	288	5	296	5670
Bananas:											
(non-UK)	703	1162	285	597	2747	0	0	0	3	3	2750
Soursop	0	914	1	34	949	0	0	42	0	42	991
Golden/sugar apples	0	762	0	947	1709	0	0	0	15	15	1724
Coconuts(dry)	3	4	0	436	443	6	0	12	377	395	838
Other fruit	25	656	0	3	684	0	0	28	0	28	712
Sub-total fruit	4297	5883	575	7216	17971	599	13	1623	646	2881	20852
Vegetables	152	71	0	52	275	15	0	40	61	116	391
Ground provisions	499	98	0	42014	42611	0	0	115	445	560	43171
Ginger	0	0	0	160	160	0	0	110	168	278	438
Others	0	0	0	8	8	0	0	5	76	81	89
TOTAL EXPORTS	4948	6052	575	49450 (1)	61025	614	13	1893	1396 (2)	3916	64941

Source: (a) Central Statistics (b) Statistical Unit, Ministry of Agriculture
(c) Annual Overseas Trade of St. Lucia, Statistical Dept., Ministry of
Finance, Planning and Statistics.
(d) Office of Statistics, Ministry of Finance, Planning and Develop-
ment

(1) Equal to total St. Vincent (Table E-4) plus 34 tonnes of soursop.

(2) Equal to total St. Vincent (Table E-4) plus 94 tonnes breadfruit.

Table E-7: Exports of Fresh Produce (excluding UK bananas) from the Windward Island Sub-Region by Commodity and by Destination, percent, 1985

Commodity	Percent Sold Within the Region	Percent Sold Extra-regionally
Mangoes	72	28
Avocadoes	98	2
Oranges	93	7
Grapefruit	77	23
Limes	99	1
Breadfruit	8	92
Plantains	95	5
Bananas	99.9	0.1
Soursop	96	4
Golden/sugar apples	99	1
Coconuts	53	47
Other fruits	96	4

Source: Calculated from previous Table E-6

Table E-8: Exports Fresh Produce (excluding UK bananas) from Windward Island
Sub-region by Type Exporter and Country of Origin, tonnes and %, 1985

Type Exporter	Dominica		Grenada		St. Lucia		St. Vincent(1)	
	tonnes	%	tonnes	%	tonnes	%	tonnes	%
Marketing Boards	0	0	13	<1	110	4	314	<1
Farmers' Organizations(2)	1146(3)	21	0	0	63(4)	3	100	<1
Huckster or trafficker	4378(5)	79	6052	99	523(6)	21	47047	97
Recent exporters	38(7)	<1	0	0	1772(8)	72	897	2
Total	5562	100	6065	100	2468	100	48358	100

Source: Table prepared by IICA from official trade statistics presented in Appendices 5 to 8.

- (1) Calculated from data in "St. Vincent a Market Profile" CARDI, St. Vincent, 1986
- (2) Only non-traditional fresh produce, does not include exports of UK bananas, spices, cocoa, etc.
- (3) Grapefruits exported by CCGA (572 tonnes), mixed produce exported by FTM (574 tonnes)
- (4) SLCGA 12 tonnes coconuts and Southwest 51 tonnes fruit/veg/flowers exported through agent
- (5) Balance, i.e. total exports less (3) and (7).
- (6) Equal to regional exports less 51 tonnes exported by Southwest
- (7) Joseph Exotics (38 tonnes)
- (8) Equal to extra-regional exports less 12 tonnes coconuts exported by SLCGA and 110 tonnes ginger exported by the SLMB.

Table E-9: Transportation Alternatives for Fresh Produce from the Windward Islands by Sea, by Air and by Country, February, 1987

Shipping alternatives	Dominica	Grenada	St. Lucia	St. Vincent
AIRLINES:				
No. flights per week				
- American Airlines	0	0	7	0
- British Airways	0	1(1)	2	0
- Eastern	0	0	7	0
- Pan Am	0	0	2	0
- BWIA	0	7(2)	19	0
- Air Carib(3)	charter			
- Caricargo(4)				charter
- Eagle Wings(5)			charter	
- LIAT	multiple	multiple	multiple	multiple(6)
- Air Martinique	tourist		tourist	tourist
- Air Guadeloupe	tourist			
- St Lucia Airways		tourist	tourist	tourist
- Moustique Airway		tourist		tourist
Cargo capacity tonnes/week (7)				
by destination:				
- UK	0	20(1)	44(10)	(15)
- Germany	0	0	3	0
- USA	0	28(9)	66(11)	(15)
- Canada	0	0	6(12)	(15)
- Barbados	low(8)	low	30(13)	6+ (16)
- Trinidad/T	low(8)	28(9)	21(14)	6+ (16)
- San Juan	low(8)	low	42(14)	0
- Virgin Islands	low	0	low	0
- St. Lucia				(17)
SEALINERS:				
Regional				
- # schooners	25-30	20-30	25-30	25-30
- # refrigerated	0	0	0	0
- # visits/month	1-4	1-4	1-4	1-4
- # ships with main cargo agriculture	8	7	4	6

continuation of Table E-9

Shipping alternatives	Dominica	Grenada	St. Lucia	St. Vincent
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Other Regional:

- Farm-to-Market Sails out of Dominica. Capacity 110 tonnes. Normal load 40 tonnes. Refrigerated.

Extra-Regional:

Geest

- frequency	weekly	weekly	weekly	weekly
- day of week	Fridays	Tuesdays	Thursdays	Wednesday
- type	breakbulk containers	breakbulk containers	breakbulk containers	breakbulk containers

Tropical(18)

- frequency	weekly
- type	container

Others: There are a number of other ships which touch the various ports but very few, if any, handle fresh agricultural produce.

Source: IICA research, 1986/87

- (1) Planned to go into service, one flight/week, April or May of 1987. Will provide service to the UK with a 20 tonne capacity, however, it is unclear if other ports will be served with this same flight.
- (2) Daily flights between: Trinidad/Grenada/Miami/Grenada/Trinidad.
- (3) 1,000 lbs capacity, flowers main cargo.
- (4) 7,000 lb capacity.
- (5) Service is very irregular.
- (6) Liat averages 1,600 lbs/per day of cargo space for fresh produce between St. Vincent and Barbados. Cargo space will vary with passenger load.
- (7) Fresh agricultural produce. Cargo capacity is very dynamic varying with tourist seasons and routing changes.
- (8) Theoretically Liat can handle small amounts of fresh cargo on these flights but these tend to be the exception.
- (9) Theoretical cargo capacity. This space will vary with the BWIA cargo space utilized out of Trinidad and Miami
- (10) BA and BWIA.
- (11) BWIA, Eastern and Pan American.
- (12) BWIA.
- (13) Since some international flights go via Barbados, the amount of produce bound for international ports will decrease the amount of space available for Barbados bound produce.
- (14) BWIA, Liat and American Airlines.
- (15) No direct flights. Shipments are made via Barbados on Liat or Caricargo. Islands are in competition for the limited cargo space from Barbados to international ports.
- (16) Capacity varies with demand, which is satisfied with chartered flights on Liat or Caricargo. Available space is a serious constraint.
- (17) Chartered flights are made to Newnanorah in St. Lucia to catch international flights.
- (18) Most containers are handled by Tropical. In 1985, of 2756 containers loaded out of Port Castries, 978 left empty.

6. COMMODITY ANALYSIS

Traditional Crops

6.1 Mangoes (Mangifera indica)

6.1.1 Market

a) Demand

The demand for mangoes is good, growing and expected to continue for the next decade in both regional and extra-regional markets, including EEC countries and North America. As increased supply forces prices downward, demand will be stimulated further. Windward Island production is unlikely to have any significant impact upon world market. Market preference is for the red cultivars, e.g. Tommy Atkins, although strong ethnic markets exist for traditional green and yellow cultivars, e.g. Julie, long, etc. Julie mango is sometimes discounted in non-ethnic markets, e.g. Germany. EEC countries imported 17,160 tonnes in 1985, of which UK and France absorbed around 35% each. The USA imported 45,000 tonnes of mangoes in 1986. Highest prices are during the off season (February-March). Heaviest supply is during the period May-August. Top dollar requires consistent high quality product, well presented. Latex and anthracnose should be controlled and product should reach destination with one week of shelf life remaining.

b) Supply

Major exporters include French Africa, Israel, South Africa, India, Mexico, Pakistan, Brazil, USA, Kenya, Caribbean, Venezuela and others. Australia is an important new entrant to the market. South Africa is presently shipping to Europe by sea. Most major producers are expanding their orchards, however, growing demand leaves room for new entrants. Within the Caribbean, Trinidad is planting largest stands. This will undoubtedly affect exports from St. Vincent and Grenada in the coming decade. Of the 1894 tonnes of produce exported from the Windward Islands in 1985, 72% was sold within the region and most of this (87%) went to Trinidad.

6.1.2 Crop adaptability

a) Ecology

All four islands have regions with favourable conditions for growing mangoes on a commercial scale. Zoning is required to concentrate production in areas with best conditions and to facilitate delivery of services.

b) Pests & Diseases

Mango seed weevil is present in Dominica & St. Lucia. This pest reduces market alternatives as produce cannot be shipped to USA, VI, Barbados and some other regional markets.

Fruit fly surveys are underway in Grenada and St. Vincent, and planned for St. Lucia and Dominica for 1987-88. To date (May 1987) no flies of quarantine significance have been recorded in Grenada and St. Vincent. However, previous studies reported Anastrepha obliqua in St. Lucia & Dominica.

c) Cultivars:

Julie, Imperial and Graham are the most important of the selected cultivars. All do well under the ecological conditions of the sub-region and do relatively well under existing cultural practices, in comparison with other selected cultivars, e.g. Florida cultivars. However, they are prone to anthracnose and do not travel as well as the Florida cultivars. Additional evaluation of the Florida cultivars is required under drier growing conditions. In addition, a major promotion effort of some local cultivars for ethnic markets should be considered.

6.1.3 Recommended Major Action Areas:

- Identify target markets for selected cultivars.
- Organize joint production/marketing effort for selected cultivars.
- Improve postharvest handling practices (harvest, hot water treatment, selection, packaging).
- Conduct mango seed weevil study to determine potential for control and eradication.
- Selection and multiplication of best clones of Julie, Imperial and Graham.
- Topworking of seedling trees with selected cultivars having market potential.
- Development of technological package and transfer to farmers.
- Training of trainers and farmers on preproduction, production, harvesting and postharvest practices.
- Evaluation of best Florida cultivars in drier areas of Windward Islands.
- Identification of most suitable areas and concentration of production within each country (crop zoning).
- Conduct fruit fly surveys in Dominica & St. Lucia.

6.2 Avocadoes (Persea americana)

6.2.1 Market

a) Demand

The market for avocado is better developed than that for most tropical fruits. It continues to grow but at a decreasing rate. Extra-regional demand is principally in Europe since the USA meets most of its' demand with internal production and also supplies Canada. Trinidad is the principal importer within the region but this market may well fade away as Trinidad/Tobago strives towards import substitution. EEC countries imported 86,698 tonnes in 1985 of which France absorbed 70% and the UK 15%. The USA imported only 7,000 tonnes of avocadoes in 1986. In 1985, only 2% of the Windward Island Sub-region production went to extra-regional markets.

b) Supply

Major avocado exporters are Israel, South Africa, and to a lesser degree, Spain, USA and Martinique. Neither Israel nor South Africa have reached full production and Israel and Ivory Coast are increasing their plantings. Many producers find it difficult to compete with Israel's rock-bottom prices. Spain is now a member of EEC and

will have comparative advantage in supplying EEC countries as will Martinique the French market. East Caribbean season coincides with high-priced market in EEC countries (June-September), Islands may have a window during August-September. Some cultivars grown in the East Caribbean do not compete well with Israel cultivars.

6.2.1 Crop adaptability

a) Ecology

All four islands have regions with favourable ecological conditions for growing avocados on a commercial scale. However, zoning is required in favour of those areas with the best conditions. This will permit the concentration of production and will facilitate the delivery of services and marketing.

b) Pests and Diseases

To date no pest of quarantine importance has been recorded for this crop. The most significant constraint to production is the presence of a foot rot caused by Phytophthora cinnamomi in all four Islands. Production in areas with poor drainage must be avoided.

c) Cultivars

The bulk of the production is derived from seedlings of a wide range of West Indian type avocados. Of selected types, Pollock, Simmonds and Lula are the most popular. Among the four Islands, Dominica has a wide collection of introduced early, midseason and late cultivars which, seasonally, may cover from July to March. Other Islands may benefit from available planting material in Dominica.

6.2.3 Recommended Major Action Areas

- Produce specifically for regional markets, tourist trade and extra-regional ethnic markets.
- Topworking of seedling trees with selected cultivars both to extend season and to develop more competitiveness.
- Development of technological packages for each country.
- Training of trainers and farmers on preproduction, production, harvesting and postharvest practices as part of production/marketing programme.
- Identification of and concentration of production in most suitable areas within each country (crop zoning).
- Promotion of the best selected cultivars among farmers.
- Avoidance of the spread of Phytophthora through nurseries.
- Planning of the production to meet the demand.

6.3 Grapefruits, Lime and Orange (Citrus sp.)

6.3.1 Market

a) Demand

Grapefruit: Can be considered a mature market, any large increase in supply will likely cause significant decline in price. Strong competition requires good quality, large volumes and low prices. Advertis-

sing is brand oriented rather than generic. Static or declining demand for Marsh seedless and increasing demand for Ruby red, both in European markets and within the region. UK continues to be best extra-regional market for Dominica product.

Orange: Demand limited mainly to the regional market. Aggregated imports within the region in 1985 was less than 3,000 tonnes. Barbados imports oranges from Dominican Republic, Guyana, Jamaica & Cuba in addition to the Windwards, mainly Dominica. Most potential lies in processing for juice and segments. The Windward Islands imported over US\$1.0 million in fruit juices, mainly orange, in 1985.

Limes: Relatively small market showing slow growth. European countries and USA demand seedless green Persian (Tahiti) lime. Competition is very keen and prices must be kept low. Product must be of consistent size and showing no signs of yellowing. Demand for West Indian seeded lime mainly within the region with some speciality markets in the USA and Europe.

b) Supply

Grapefruit: Major exporters include Israel, USA, Cyprus, South Africa, Argentina, Swaziland, Honduras, Cuba and Spain. Cyprus, South Africa and Cuba are expanding production. Exports from the USA are on the increase. Israel is replanting its Marsh seedless with Ruby red. Many producing countries are beginning to limit exports to avoid depressing prices. Dominica is major producer within the region but less than 10% of its' production is Ruby red. Dominica fruit is sweet, considered better quality than Israel/Cyprus grapefruit but is more expensive. USA, Honduras and Cuba fruit are larger, of same quality and sell at lower price. Dominica continues to have window in UK market during six weeks in August - September but is slowly losing competitive edge. Trinidad is extending its plantings, mainly for domestic consumption

Orange: Trinidad is extending its plantings of oranges and Jamaica and Belize have capacity to expand. Dominica and St. Lucia are largest suppliers in the Windward Islands. Exports from the Sub-region in 1985 were 766 tonnes and all but 5 tonnes remained within the region.

Limes: Martinique, Guadeloupe and Dominica are major suppliers along with Brazil, USA, Mexico, Cuba, Israel and Haiti. Most of the Dominica production is of the West Indian cultivar. USA and S. Africa can supply all year long while Brazil and Mexico will soon reach this objective. Major importers are not interested in another source.

6.3.2 Crop adaptability

a) Ecology

All four Islands have regions with excellent ecological conditions for growing grapefruit, limes, and to a lesser degree oranges, on a commercial scale. A more technical zoning is required so as to

concentrate production in the most suitable areas and to facilitate the delivery of services.

b) Pest and Diseases

To date no pest or disease of quarantine importance have been recorded in Grenada or St. Vincent where fruit fly surveys are underway. Similar surveys are planned for St. Lucia and Dominica in 1987. The presence of Anastrepha obliqua in Dominica and St. Lucia have been previously recorded and may require clearance for USA Territorial markets. None of the Islands have a virus indexing programme and sour orange is the only rootstock being used commercially. The presence of tristeza virus in Carriacou has been mentioned but not confirmed. Withertip of lime can be problematic.

c) Cultivars

- Grapefruit: Marsh seedless is the most important cultivar in all four Islands. Ruby red is becoming more popular in Dominica and to a lesser extent in St. Lucia. Top working is an economic method for adjusting production level to real market demand.
- Limes: The West Indian limes (also known as Mexican or Key limes) are the most important in the four Islands. The lack of selection is noticed in the wide variation (good and bad), often within the same orchard. The Tahiti (Persian or Bear) lime is also being planted and is gaining popularity.
- Oranges: Washington navel is the most important cultivar in Dominica, Grenada and St. Lucia, followed by Valencia. In St. Vincent, Valencia is the most common. As can be expected, particularly in the low lands, W. navel often produces large fruits with low juice content. In many cases, the Valencia clones in use, especially in St. Lucia, do not mature late (as Valencia normally does) but tend to behave more like a midseason orange. These clones need to be re-evaluated and new clones introduced to extend the production season.

6.3.3 Recommended Major Action Areas

- Increase intra-regional exports to take advantage of Dominicas longer growing season.
- Extend orange and lime fruiting seasons.
- Introduce easier peeling varieties of orange for tourist industry.
- Develop orange juice industrial capacity in Dominica, St. Lucia or both.
- Identify speciality markets for West Indian limes in USA and Europe.
- Selection of best clones of West Indian limes.
- Carry out fruit fly survey in St. Lucia & Dominica.
- Development of technological packages for each country and transfer to farmers.
- Training of trainers and farmers on preproduction, production, harvesting and postharvest practices.
- Identification of and concentration of production in the most suitable areas within each country (crop zoning).
- Introduction and testing of new citrus rootstocks.
- Initiation of a citrus virus indexing programme.

- Initiation of a citrus budwood registration and certification programme.
- Evaluation of existant Valencia clones and introduction of others as needed, to extend harvest season and improve quality.
- Planning of the production to meet the demand.

6.4 Breadfruit (Artocarpus altilis)

6.4.1 Market

a) Demand

Demand statistics are unavailable. Most production from the Windward Islands presently goes to ethnic markets within the UK and small amounts to Canada. In 1985, 941 tonnes were exported to these two markets. Additionally, 13 tonnes were shipped to the USA market. J.R. Brooks of Homestead Florida is developing a market in the USA. Present demand is estimated at 13 tonnes/week. Present demand through CATCO is approximately 20 tonnes /week. Product has short shelf life (less than 5 days) thus shipments must be made by air and pre-cooling is desirable.

b) Supply

Trial shipments (13 tonnes in 1985) have been made from Grenada to Miami. St. Vincent shuttles produce from that island to St. Lucia for re-export to the UK. The bulk of the exports from the Sub-region, however, are made from St. Lucia. In 1985, St. Lucia exported 918 tonnes of which 92% went to the UK and the remaining 8% was sold within the region. St. Vincent exported 94 tonnes to the UK and Canada. Each of the exporting countries is improving upon its post-harvest handling practices, experimenting with washing, pre-cooling and individual wrapping in an effort to increase shelf-life.

6 4.2 Crop Adaptability

a) Ecology

The four Islands have natural ecological regions with excellent conditions for growing breadfruit commercially. However, the main source of production is from isolated trees spread over the islands, or in the best of the cases, from scattered groups of trees. The existance of sheltered areas with excellent conditions for growing breadfruit opens the possibility to concentrate production on commercial size orchards.

b) Pest and Diseases

No pests or diseases of quarantine importance have being recorded on this crop. Very few pests & diseases of economic importance affect breadfruit production. Exceptions are Rosellinia sp. and Diaprepes sp., both affecting the root system of breadfruit in Grenada.

c) Cultivars

There is no true cultivar of breadfruit in the Windward Islands. In St. Vincent, three 'types' (common, cashee and cocobread) are recognized and to some extent their characteristics are known. Several other 'types' are known in St. Lucia (cream, white, etc.). The propagation of breadfruit at all nurseries in the Windward Islands is

done from any available tree regardless of its characteristics (good or bad), and without any differentiation of the source. Given the wide variation of fruits (size, weight, colour, texture, etc.) and trees (size, yield, etc.), a good selection programme is needed. Harvesting is one of the most difficult operations with this crop because of the height of most trees. Introduction of pruning practices may be advantageous.

6.4.3 Recommended Major Action Areas

- Evaluation of the USA market for breadfruit.
- Selection and characterization of best clones and their commercial propagation.
- Rehabilitation (pruning) programme.
- Concentration of production in commercial orchards, in best areas, with pruning as an integral part of cultural practices.
- Development of local technological packages and transfer to farmers.
- Training of trainers and farmers in pre-production, production, harvesting and postharvest practices.
- Study and control of Rosellinia sp. and Diaprepes sp. on breadfruit in Grenada.
- Adopting rapid methods for massive propagation.
- Introduction and testing of dwarf clones from Fiji germplasm bank.

New Crops

Short and Medium Term Crops

6.5 Papaya (*Carica papaya*)

a) Market

Papaya has a strong and growing market in the USA and to a lesser degree in Europe. The Sub-region is only beginning to develop export potential. This is being done through MDA/IICA/CATCO experiments in Barbados and beginning in the Windward Islands. Test commercial plots are in production in Barbados and experimental pilot production projects are being organized in St. Lucia, Grenada and Dominica. Test marketing from Barbados to UK & Holland has been carried out through CATCO with very positive results. Present weekly shipments of 100-150 five kg boxes are being made and demand is estimated at 6,000 boxes/week. Barbados is presently gearing up for production. UK imports approximately 500 tonnes per week. A fairly strong regional market is felt to exist, particularly within the tourist sub-sector.

b) Crop adaptability

-Ecology

All four islands, especially St. Vincent and St. Lucia, have regions with favourable conditions for growing papaya on commercial scale.

-Pests and Diseases

No pests or diseases of quarantine importance have been recorded in Grenada and St. Vincent where fruit fly surveys are in progress. Dominica and St. Lucia are planning similar surveys. Both these

latter countries have recorded Anastrepha obliqua and may require clearance for USA markets. Bunchy top is by far the most important problem limiting production and it is present in all four Islands. A bacterial disease caused by Erwinia sp. has been found in St. Lucia.

-Cultivars

From the market point of view the Solo group (sunrise, kapoho, waimanalo, etc.) are the first choice in recommended cultivars of Papaya. However, due to the presence of Bunchy top in the Islands, only tolerant or resistant lines are recommended. Selections of the 'Solo hawaiana' and 'yellow solo' are now available in Barbados. Even with these, however, an intensive spray programme is needed to keep down the population of the insect vector.

6.6 Passion Fruit (*Passiflora edulis*, f. *flavicarpa*)

a) Market

The market for passion fruit is relatively new but is growing rapidly as an exotic fruit drink and as a mixer with other fruit juices. It is normally processed in the producing country and exported as a concentrate. It is now being bottled in plastic containers in the Dominican Republic for retailing on the domestic market. It is a fruit with a big future for export as well as for the tourist industry. Agro-processing efforts are underway in Dominica.

b) Crop adaptability

-Ecology

All four Islands have regions with favourable ecological conditions for growing passion fruit. However, zoning is recommended to identify the best growing areas.

-Pests and Diseases

No pests or diseases of quarantine importance have been recorded. The larvae of *Juno* sp. is expected to be the most significant pest affecting production as it is in almost all major producing countries.

-Cultivars

There are many cultivars available for today's demand. Each producing country has its own local types. Hawaii, Brazil and Venezuela have large collections of selected types. Selections from Hawaii include Waimanalo (C-39, C-54, C-77, C-80), Kapoho, Pratt, Yee, Noel's Special, etc. There are also hybrids between the purple and the yellow passion fruit. These include *Variegatum* (Florida), *Redlands triangular* and E-23 (Australia).

6.7 Soursop (*Annona muricata*)

This crop is found spread throughout the islands of the Caribbean. However, since there are no commercial orchards in the Windward Islands, it is here considered as a new crop.

a) Market

As one of the exotic fruits, statistics are unavailable as to imports. Soursop is recognized as a fruit with potential, particularly as a juice and ice cream flavouring. Fresh frozen fruit pulp is exported from the Dominican Republic and Central America to the USA market. Fresh produce is exported to the ethnic markets in the UK and Canada.

b) Crop adaptability

-Ecology

All four islands have significant areas with excellent ecological conditions for growing soursop on a commercial scale. The identification of the most suitable areas within each Island is recommended so as to concentrate production and facilitate the delivery of services and marketing.

-Pests and Diseases

No pests or diseases of quarantine importance have been recorded. Obtaining fruit fly free status is very important in clearing the way for new markets, particularly in the USA.

-Cultivars

Most producing countries have a number of local selections. Within the Sub-region, Grenada has selected a number of clones with good characteristics. Puerto Rico has over 14 different selections.

6.8 Pineapple (*Ananas comosus*)

a) Market

The world market for pineapple is considered excellent and volume of consumption, among fruits, is only surpassed by citrus and banana. Like bananas, pineapple marketing is in the hands of multinational companies and is very, very competitive. It is extremely difficult to break into the extra-regional markets unless large supplies of very good quality fruit can be made available continuously at a competitive price.

b) Crop adaptability

-Ecology

St. Lucia has regions with favourable ecological conditions for the production of pineapple on a commercial scale.

-Pests and Diseases

No pest or disease of quarantine importance have been recorded in St. Lucia.

-Cultivars

While the local and regional markets prefer the sweet, soft types of pineapple, e.g. Antigua black, it is probably preferable to plant double purpose (fresh and processing) cultivars such as Smooth Cayenne, as the yields are better and the shelf life is longer. However, there does exist an ethnic market for the Antigua black.

Other Fruit with Medium to Long Term Development Potential

6.9 Carambola (Averrhoa carambola)

a) Market

Carambola is considered an exotic tropical fruit and as such has an expanding new market in the USA. This fruit could well represent the West Indies answer to the Kiwi fruit. There are very few producers of this fruit in the world. Florida is one of the largest producers at the present time with approximately 300 acres in pure stand orchards. Guyana is a major producer but its trees are scattered over a very wide area in an unorganized fashion. The growing demand for this exotic, combined with the favourable growing conditions in the Windward Islands, gives this Sub-region a comparative advantage in the growing of this fruit. Given the Florida season during the months of mid-August to the end of December, with peak production during the months of September-October, means there is a market window during the period January-July.

b) Crop adaptability

-Ecology

All four Islands have regions with favourable ecological conditions for growing carambola on a commercial scale.

-Pests and diseases

No pests or diseases of quarantine importance that may affect carambola have been recorded in the Windward Islands. Fruit fly free status of the Islands will contribute favourable to the comparative advantage of this Sub-region in producing carambola. The presence of Anastrepha obliqua in Dominica and St. Lucia may require clearance for the U.S.A. markets.

-Cultivars

Golden star is probably one of the sweetest traditional cultivars. More recently the cultivars Arkins, Thayer, B-10 and Hew are being planted and dominating in popularity because of overall qualities.

6.10 Cashew (Anacardium occidentale)

a) Market

The market for the cashew nut is considered excellent in Europe and particularly in North America. Prices are high due to the scarcity of supply and the considerable added value as a result of agro-processing. Due to economies of scale in agro-processing, extensive plantings are required. The pseudo fruit to which the cashew nut is attached can be processed into preserves and wine for which there is a limited demand.

b) Crop adaptability

-Ecology

St. Lucia, and to a lesser degree the other Islands, have marginal dry lands unsuitable for growing the more traditional crops. Much of these lands have the potential for growing cashew on a commer-

cial scale. Cashew honey also is of good flavour and a cashew production/beekeeping project may be feasible.

-Pests and diseases

Since the cashew nut is processed prior to export, plant quarantine is not a problem. However, cashew does have some susceptibility to anthracnose, capsids and mites, which may affect production.

-Cultivars

Local selections exist in most of the leading producing countries, e.g. Brazil. There are basically two types, these being the red and the yellow. Most of the selections are characterized by the larger size of the nut.

6.11 Asean fruits (Mangosteen, Rambutan, Pullasan, Langsat, Durian)

a) Market

The market for these fruits varies considerably and is a function of ethnic populations, principally Asian. They are considered exotic fruits with a growing market potential in the USA and in some European countries where they are better known. The mangosteen is considered the Queen of the tropical fruits but unfortunately has a relatively short shelf life, as do most of these Asean fruits, and takes many years to come into bearing. The relatively nearness of the West Indies to the North American market, and the necessity for air transportation, gives this Sub-region comparative advantage in their marketing.

b) Crop adaptability

-Ecology

Among the high humid regions of the Windward Islands there are areas with favourable ecological conditions for growing these fruit crops in commercial scale. The identification of the best suitable areas is however recommended.

-Pest and diseases

No pests or diseases of quarantine importance have been recorded in the Sub-region, except Anatrepha obliqua in Dominica and St. Lucia, that may affect these crops.

c) Source of planting material

Malaysia, Thailand, the Philippines and Indonesia.

7. REGIONAL EXPERIENCES FROM CATCO AND WINDBAN

7.1 Caribbean Agricultural Trading Company Limited (CATCO)

7.1.1 Historical background

The Caribbean Food Corporation (CFC) was established in 1976 as the main implementing agent of the Regional Food and Nutrition Strategy (RFNS). Its objectives included the production, processing, packing, storage, transportation, distribution and marketing of food and the marketing of agricultural inputs. Participation in the CFC is open to all CARICOM members and its activities are carried out under the policy direction of its Board of Governors consisting of the Ministers of Agriculture of shareholder countries.

The Board of Directors of CFC in October 1980, by resolution, authorized the establishment of a marketing and trading corporation to be located in Barbados. On October 16, 1981, the Caribbean Agricultural Trading Company Limited (CATCO) was incorporated as its marketing subsidiary. CATCO was to be managed under management contract by a suitably experienced regional organization skilled in agricultural trade. The CFC maintained a majority share-holding of fifty-one percent (51%) and national private sector organizations were invited for the remaining forty nine percent (49%).

On December 12, 1981, CATCO's Board of Directors appointed Grace, Kennedy and Company Limited (GKCO) of Jamaica to provide the management of CATCO. The GKCO signed a Shareholders' Agreement with CFC and held the total private sector share allocation with the understanding that it would ultimately seek to divest the shares among other private sector companies.

During the two year period in which CATCO was managed by GKCO the trading company was characterized by uncertainty, experimentation and search for operational resources. Three different general managers led CATCO through a process of trial and error with agricultural input trading, intra-regional marketing of perishables, trading contracts with farmers and farmer organizations and spot hire of air and sea transport. The principal activity during this period was the trading of agricultural inputs, not the main purpose for which CATCO had been established. Resources were solicited from USAID and EDF and technical assistance was made available under a technical assistance grant from the Inter-American Development Bank (IDB). Both management and trading practices were deemed weak and on February 29, 1984 the CATCO Board and GKCO reached an agreement to terminate the GKCO contract.

Beginning March 1984, the CATCO Board asked the SYSTEMS Group of Companies to provide month to month management of CATCO. This continued until October, 1984 when the USAID loan disbursement pre-condition, requiring a tendering process to select the management company, was met and SYSTEMS was given a one year contract to manage CATCO. Priority was given to intra-regional trading and throughout March-December 1984 trading of bananas, plantains and oranges took place on a regular basis.

In the meantime the EDF technical assistance funds had been processed as part of a joint SYSTEMS/FINTRAC contract. Technical assistance from FINTRAC, in the form of an economist and a specialist in postharvest handling of perishables, arrived in October and December, 1984, respectively. These experts helped SYSTEMS initiate extra-regional export trading in February 1985, however, intra-regional trade continued to constitute more than 50% of volume.

The EDF technical assistance, delivered through FINTRAC, served as advisory management support as SYSTEMS only had in place at CATCO, on a full-time basis, a General Manager, Trading Manager and two clerical assistants.

The SYSTEMS contract was terminated in June 1985 by the CATCO Board of Directors.

In July 1985, the advisory management technical assistance from EDF was transformed into full management support for CATCO in the form of a management contract to FINTRAC. The FINTRAC management team comprised a general manager, a postharvest technologist, a marketing advisor, and an accountant, all with temporary executive responsibility.

During the first few months of management under FINTRAC, emphasis was given to minimizing losses and recuperating bad debts incurred during the first four years of operation of CATCO.

The management of CATCO during its first four years reflects both capabilities and inexperience in the complex nature of developing and marketing of agricultural produce, particularly in the extra-regional markets. To be still alive and operational today is a clear reflection of the commitment to the need for a facilitating type marketing entity within the region.

7.1.2 CATCO's Organizational Structure and Personnel

CATCO organizational structure is headed by a four man Board of Directors presiding over the General Manager and a staff of ten. The central office is maintained at the Grantley Adams International Airport of Barbados. Under the General Manager there is a Technical Adviser (postharvest technologist) and an Accountant. Whereas the Accountant oversees a Secretary and a Driver/messenger, the Technical Adviser coordinates a team consisting of marketing advisers in Guyana and Antigua, a Sales Coordinator in Barbados and Trading Managers located in Dominica, St. Lucia and Trinidad. A European Representative is based in London.

The management of CATCO is currently provided, under contract, by FINTRAC Consulting Ltd. under technical assistance funded by the EEC to cover, currently, the General Manager, Postharvest Technologist, Accountant and one Marketing Adviser. Other grants are provided to CATCO by USAID, COLEACP and CFTC. The USAID grant covers the costs of one Marketing Adviser, the Sales Coordinator in Barbados and the Trading Manager in Trinidad. The COLEACP grant covers the costs of the Trading Managers in St. Lucia and Dominica, and the CFTC grant covers the costs of CATCO's representative in Europe.

All personnel other than the General Manager and the Postharvest Technologist are locally hired.

7.1.3 Marketing functions

The principal function of CATCO is that of marketing fresh produce from the region. In fiscal year 1986/87, 86% of produce traded was marketed in Europe and North America. The remaining 14% was marketed within the region. The marketing functions are carried out under the direction of the General Manager, the Technical Adviser and the Sales Coordinator, all located in the Head Office in Barbados. The two marketing advisers and the three trading managers, residing in countries of the Region, are informed well in advance of the demands for produce in the marketplace. Based on these demands they identify and coordinate with the respective growers and suppliers. Their functions include negotiation of contracts, coordination of transportation, supervision of produce quality during the packing stage and whatever else may be required to assure that a product of the proper standards is placed on the carrier and ready for export.

To assure proper produce quality for the market, CATCO provides support services such as supply of seeds, field crates and, in at least one case, refrigerated containers. Efforts have been made to improve the growers understanding of marketing functions by organizing meetings with key participants in the food system and through in-service training, including visits to the marketplace to discuss problems with importers.

7.1.4 Products and Volume Marketed

Considering the early history of CATCO, effective marketing of fresh produce began only in early 1985. Given that CATCO came under new management in July 1985, it seems logical to begin any analysis of CATCO effectiveness from that point. As detailed in Table E-10, total sales made by CATCO in 1985/86 (July to June) were 368 tonnes. Of this amount, 291 tonnes were fresh produce sales in extra-regional markets and 77 tonnes were fresh produce sales in regional markets. In 1986/87 CATCO sales increased by 43% to 527 tonnes. Sales to extra-regional markets increased by 69% to 491 tonnes. During this same period regional sales dropped by 53%, to 36 tonnes. The reason for this drop was due to the inability to establish an effective marketing arrangement with the Banana associations for the regional marketing of that commodity.

Value of sales by CATCO increased from B\$750,385 in 1985/86 to B\$1,206,312 in 1986/87, an increase of 61% (Table E-11). CATCO management is very positive about the potential for future sales and extra-regional exports are projected to increase by over 140 percent during 1987/88 while regional sales are expected to increase by nearly 700 percent. Approximately one-half of the expected value of sales projected for 1987/88 is to be derived from produce supplied under grower contracts or by farmer-members of farmers organizations.

Table E-10: Actual Sales of Produce by CATCO by Destination,
Commodity and Financial Year (kg)

Destination & Commodity	Sales 1985/86	Sales 1986/87
Extra-Regional:		
- mango	33,571	16,534
- breadfruit	22,167	16,951
- papaya	518	4,497
- watermelon	1,001	89,705
- hot pepper	31,886	66,709
- sweet pepper	11,448	2,266
- okra	10,840	7,980
- aubergine	16,789	12,035
- cucumber	0	73,185
- pumpkin	1,169	76,718
- sweet potato	30,337	29,946
- tannia	13,098	333
- eddoes	13,363	4,320
- yam	56,498	0
- ginger	28,321	70,031
- others	20,034	19,438
Sub-total	291,040	490,648
Regional:		
- bananas	56,050	0
- plantain	20,084	35,263
- strawberries	-	590
- other	454	0
Sub-total	76,588	35,853
TOTAL	367,628	526,501
Miscellaneous:		
- cut flowers (blooms)	4,520	6,290
- processed items (tins)	85	927
- seeds	(1)	(1)
- coconuts	740	4,149

Source: CATCO

(1) Quantity unknown, see value of in Table E-11.

Table E-11: Sales of Produce by CATCO by Destination, Commodity and Financial Year (Barbados \$)

Destination & Commodity	Sales 1985/86	Sales (1) 1986/87	Projected for 1987/88
Extra-Regional:			
- mango	77,464	66,372	87,676
- breadfruit	46,226	63,855	-
- papaya	0	11,173	91,488
- watermelon	7,732	128,414	324,020
- hot pepper	109,009	221,559	266,840
- sweet pepper	26,784	7,665	38,120
- okra	29,146	28,522	266,840
- aubergine	34,237	36,754	38,120
- cucumber	0	65,914	356,422
- pumpkin	0	106,470	196,318
- sweet potato	47,485	85,692	133,420
- tannia	21,816	462	-
- eddoes	21,946	8,400	76,240
- yam	110,550	0.0	133,420
- ginger	63,908	167,061	133,420
- others	31,145	68,317	457,656
Sub-total	627,448	1,066,630	2,600,000
Regional:			
- bananas	74,542	0.0	180,000
- plantain	25,757	39,350	180,000
- strawberries	-	4,104	-
- other	3,576	8,845	40,000
Sub-total	103,875	52,299	400,000
TOTAL	731,323	1,118,929	3,000,000
Miscellaneous:			
- cut flowers	7,419	2,817	-
- processed products	0	40,406	-
- seeds	11,643	44,160	-
Sub-total	19,062	873830	-
GRAND TOTAL	750,385	1,206,312	3,000,000

Source: CATCO

(1) Last quarter (April-June) is estimated.

As indicated in Table E-12, tree fruits as a percentage of the total volume of sales by CATCO is on the decline and is expected to be no more than 8% of sales in 1987/88. Root crops is also tending downwards. On the other hand, winter vegetables and melons are showing significant growth. These changes have come about purposely as CATCO attempts to minimize competition with existing traders and promote the production of winter fruits and vegetables under grower contracts.

The origin of the fresh produce handled by CATCO in the past two years is shown in Table E-13. Whereas in 1985/86 there were six supplying countries, these increased to eight in 1986/87. At the same time there was a significant drop in the overall percentages supplied by Barbados, St. Lucia and St. Vincent while there were corresponding increases in the proportions supplied by Trinidad, Antigua and, to a lesser degree, Dominica. CATCO was not active in Grenada during either of the past two years.

Table E-14 shows the destinations (markets) of the produce handled by CATCO during the past two years. Whereas three extra-regional markets and one regional market absorbed total sales in 1985/86, those increased to four extra-regional markets and three regional markets in 1986/87. The percentage of sales going to the UK market declined from 72% in 1985/86 to 43% in 1986/87. Other significant changes were an increase of sales on the Canadian market from 4% to 17% and on the USA market from 0% in 1985/86 to 18% of total sales in 1986/87. Sales in Barbados declined from 14% in 1985/86 to 5% in 1986/87.

Table E-12: Sales of Produce by CATCO in Extra-Regional Markets by Commodity Group and Financial Year (percent)

Commodity Group	Sales 1985/86	Sales 1986/87	Projected for 1987/88
Tree fruits	21	14	8
Melons	1	13	15
Vegetables	33	47	55
Root crops	45	26	22
Total	100	100	100

Source: CATCO

Table E-13: Sales of Produce by CATCO by Country of Origin and Financial Year (percent)

Country of Origin	Sales 1985/86	Sales 1986/87
Barbados	52	21
St. Lucia	15	5
Trinidad	8	33
St. Vincent	21	8
Dominica	3	5
Antigua	1	26
Jamaica	0	<1
Guyana	0	2
Total	100	100

Source: CATCO

Table E-14: Sales of Produce by CATCO by Country of Destination and Financial Year (percent)

Country of Destination	Sales 1985/86	Sales 1986/87
UK	72	43
Holland	10	16
USA	0	18
Canada	4	17
Barbados	14	5
Trinidad	0	<1
St. Lucia	0	<1
Total	100	100

Source: CATCO

7.1.5 Lessons Learned

Study of the CATCO experiences over the past five and one-half years provides a series of insights into the difficulties and the potential of marketing in the Eastern Caribbean. An attempt will be made to summarize some of these lessons.

- 1) Developing a marketing entity takes time and mistakes will be made. CATCO has had at least six General Managers in less than six years. Each General Manager has given priority to a different particular area, e.g. agricultural input marketing, regional marketing, extra-regional marketing and recovery of outstanding funds. Only in the past two years has CATCO been able to systematically concentrate on improving efficiency and effectiveness and building a core staff.

- 2) **Marketing must be backstopped with developmental activities.** Given the developing nature of small farmers, farmers organizations, exporters and governmental institutions, a regional marketing entity cannot assume the existence of efficient growers, suppliers and support institutions. Given this situation, CATCO has had to contribute significant time and resources to developmental activities including training, farmer organization, design of packing house operations and others, thus risking spreading itself too thin. A concentrated effort among national, regional and international organizations to organize production would greatly facilitate the marketing function.
- 3) **Operations must be decentralized.** Given the deficiencies at the national level it becomes impossible to coordinate regional marketing from one central point, i.e. Barbados. CATCO has realized this and is now establishing trading managers in each of the important supply countries. However, even these will be insufficient unless support is obtained from national and other institutions within each country.
- 4) **Developing extra-regional markets requires expertise.** Developing markets in Europe and North America cannot be done from the Caribbean alone. There is a need to have a presence in these markets which can best be provided by persons with experience and expertise in those markets.
- 5) **Commodities with the most potential in extra-regional markets are those with the following characteristics.**
 - Reduced competition from southern European, North African, Israeli, Mediterranean and USA growers.
 - Undersupply in existing ethnic market in Europe and North America.
 - Little established consumer expectation in terms of size, shape, colour, and other quality traits.
 - Existing grower experience.
 - Resistance to local pests and diseases.
 - Products which have crossover potential from ethnic market to European market, e.g. pumpkin, plantain, okra.
- 6) **Too much competition may have negative side effects.** It may lead to CATCO, Geest and other exporters specializing in particular commodities, thus putting farmers in a weak bargaining position. Competition for the same cargo space will also hinder growth in the industry. Too strong competition may lead to a decline in the number of exporters.
- 7) **Lack of organized production is a serious constraint.** Typical small farmer production, i.e small volumes of low quality produce, is not conducive to extra-regional marketing. There is a definite need for the improved organization of small farmers to produce specified amounts of quality produce on a contractual basis. This will require more and stronger farmers organizations and the corresponding institutional support services.
- 8) **Value added products are difficult to market.** A wide variety of home and cottage industry products are produced within the region. However, high prices and poor presentation of products have generally prevented development beyond sample shipments.

- 9) **Transportation to European markets is a major constraint.** Availability and the costs of transportation often determine which products are selected for export. Geest can monopolize the exports of some commodities, e.g. ginger, by selling or not cargo space. Transportation to North American ports is less of a constraint.
- 10) **Demand for tropical produce is on the increase.** Throughout Europe and North America the interest in tropical produce and demand for year-round supplies is still increasing. Despite competition from other sources the Caribbean retains some comparative advantages as a supplier. Demand for CATCO products in 1986/87 was generally much greater than their ability to supply in both the European and the North American markets. Some 60 tonnes of CATCO watermelon, sweet potato, hot pepper and capsicum were marketed in UK supermarkets in 1986/87.
- 11) **Supply of tree fruits are limited.** The quantity of quality fruit suitable for export is limited, therefore, when CATCO purchases these items (breadfruit, mangoes, citrus, soursop, golden apple, and others) she is competing directly with established exporters and prices are driven up. Although the farmer benefits from the higher prices, over the short-run, the exporter finds it more difficult to compete in the external markets and may eventually be forced out of the trade.
- 12) **There is a need to build CATCO trade on short term crops.** To avoid competition with established traders and to be able to programme production more effectively CATCO will give priority to the production of vegetable and root crops. Highly perishable winter vegetables are more effectively produced in those islands having low levels of rainfall and good air transportation links.
- 13) **Tree crop competitiveness.** Best supplies exists for mangoes and breadfruit. However, supplies of quality fruit of these two commodities do not satisfy existing demand. Avocados have limited potential at the present time due to the relatively small volumes of good marketable quality. Grapefruit from Dominica cannot compete price-wise on the international market outside of a six week window for the UK market. Supplies of limes of the Tahitian or Persian cultivars are quite small and the high percentage of yellow colour on the fruit make them less competitive. Oranges do not compete well on the extra-regional markets because of low quality, small volumes and lack of continuity of supply. The other exotic tree crops, e.g. soursop, golden apple, sugar apple, guava, canepe, and other non-traditional fruits, are available in insufficient quantities and too poor in quality.
- 14) **Continuity in the marketplace is needed.** Effective marketing requires a constant presence in the marketplace. A trading company must be in the market on a weekly basis, even if losses occur. Presence in the market and continuity of supply, even if at a loss, gives customers faith in the supplier and will eventually lead to larger orders and profitability. Financial backing must be sufficient to permit a trading company to look at profits and losses over a one year period rather than daily or weekly as occurs with the small traders.

- 15) **Specialization is needed.** Trading companies, both large and small, should be specialized in a few crops and not expand into others until they master the supply of a few at a high degree of efficiency. Each crop has its own particular characteristics and needs for production, harvesting and postharvest handling. CATCO is attempting to reduce the number of products handled from 46 in 1985/86 to 10 or fewer in the future. For the lack of specialization the Caribbean is losing comparative advantage in the production of such items as ginger. Other countries such as Hawaii, Taiwan, Brazil and India are beginning to produce better quality and present it better in the market place. Without concentrated and continuous efforts in the organized production/marketing of selected crops the Windward Islands are likely to continue losing comparative advantages.

- 16) **There is a minimum volume threshold for diversification and agricultural development.** For diversification and agricultural development to take place in the Caribbean volume of production must be substantially increased. Small existing traders selling to ethnic markets will not be able to stimulate sufficient increases in volumes handled. Large scale production will require a trading company capable of handling large volumes of produce and sufficient financial backing to withstand large losses in one crop or over one season.

7.2 WINBAN

7.2.1 Importance of the Banana Industry

The banana industry is the most important sub-sector of the economies of the Windward Islands, with the exception of Grenada. Banana production is the main source of income and employment for the large number of small farmers, and the rural population generally, and is the largest single earner of foreign exchange in three of the islands. For example, in 1982, bananas alone accounted for 45%, 41% and 25% of total export earnings and 17%, 14% and 13% of GDP of the main producer islands, i.e. Dominica, St Lucia and St Vincent, respectively.

This illustrates the heavy dependence on the banana industry in these islands, not only at the macro level, for its contribution to GDP, foreign exchange earning and the like, but moreso at the micro level, for its direct contribution to the livelihood of both the large and small farmer population, as their only and regular source of cash income.

7.2.2 Historical Background

Banana Associations were formed in each of the Windward Islands in the early 1950's. In 1952 the St. Lucian and Dominican Banana Growers' Associations began selling fruit to the company Band and Folly. This company was taken over by Geest Industries and in 1953 the first contract between the two Associations and Geest was signed. St. Vincent and Grenada Banana Growers' Associations signed contracts with Geest the following year.

The need for a WINBAN type structure that would simultaneously represent the four banana growers's associations was identified earlier but it was only when discussions leading to the initiation of the Banana Insurance Scheme were taking place that the decision to formalize WINBAN was taken. The WINBAN Insurance Scheme was thus one of the first benefits to accrue to growers from the formation of this multi-national body.

WINBAN was registered in Roseau, Dominica on August 19, 1958 under the Companies Act Chapter 140, as a company limited by guarantee and not having a share capital. It was subsequently registered in the other three Windward Islands. Its registered office is in Castries, St. Lucia.

The Memorandum and Articles of Association have remained unchanged since the incorporation of WINBAN, except that with increasing administrative and management functions, a position of Managing Director was established by resolution of the share holders represented by the affiliate Banana Growers's Association in the islands.

The objects of the Company place responsibility on WINBAN, as an organization, inter alia, to "promote, foster and encourage and institute measures for the well being of the banana growers in the islands of Dominica, Grenada, St. Lucia and St. Vincent and to protect their interests and further the objects of the Banana Growers's Associations in the respective islands; to take steps to improve cultivation, production, yield, fruit quality, etc., of bananas, through appropriate research and

development activities; and to represent the common interests of the Island Associations in dealing and negotiating with buyers of banana produced by the Associations."

7.2.3 WINBAN's Organizational Structure and Personnel

Each island Association is required by the Articles to appoint two representatives to the Board of Directors of WINBAN, one of which shall be selected to be the Director of WINBAN and the other as an alternate Director. Accordingly, the Board of Directors of WINBAN comprises one Director from each of the four Island Associations and a Managing Director. One of these Directors is appointed President of WINBAN at each annual general meeting.

To administer the affairs of the industry, WINBAN, as an organisation, consists structurally of five divisions:

- 1) An Administration Division responsible for all corporate aspects; personnel management and development and negotiations/liasion with worker representatives.
- 2) A Finance and Accounting Division responsible for the controllership and treasurership function, monitoring of financial matters related to contracts, and the procurement of inputs, as required on behalf of the Associations.
- 3) An Economic and Statistics Division responsible for the collection, analysis and interpretation of economic data in order to provide guidance to the industry; the preparation, monitoring and evaluation of projects.
- 4) A Research and Development Division responsible for defining, analysing and providing practical and economical solutions to problems confronting the industry in the areas of production, diseases and pests and fruit quality.
- 5) A UK-based Market Monitoring Division responsible for monitoring of market conditions and the marketing arrangements with buyers of Windward Islands Bananas and for the general representation of the Windwad Islands Banana Industry at international fora concerned with bananas.

The day-to-day management of WINBAN is carried out by a Managing Director who supervises the activities of the Secretariat consisting of the Company Secretary, Financial Manager and Economist, and the head of the Research and Development Division. In addition, the Managing Director has responsibility for the activities of the UK representative whose main function deals with contract negotiations and monitoring.

The total number of persons employed by WINBAN is approximately 70. The Managing Director and four senior management staff may be termed administrative. These are supported by some six senior technical officers, nine technical support staff, including clerical staff, and approximately 35 daily paid workers, including 26 farm workers. Between 50 and 60 of the total number of employees work in the Research and Development

Division. Technical staff in this Division includes a chemist, fruit quality scientist, crop protection officer, agronomist and an extension agronomist.

7.2.4 Facilities and Assets

The Research and Development Laboratories and other facilities are located at Roseau (St. Lucia) while the Administrative Offices which house the Secretariat are located on the William Peter Boulevard, in Castries. The facilities at Roseau include 30 acres of land (8 acres purely commercial), main office building, laboratories, ripening rooms, communications offices, library, conference room and others.

WINBAN possesses the normal equipment associated with chemistry, crop protection, fruit quality and plant pathology laboratories. Other equipment includes that used for irrigation, one standby electric generator, four Land Rovers, one truck, five pick-up vans and three motor cars. Additional, there are two vehicles in each of the other three islands, one each for the use of the Leaf-spot coordinator and the Fruit Quality Officer. In St. Vincent the WINBAN Field Officer has a Land Rover.

WINBAN's activities are financed through cess contributions from the member Associations, however, assistance is also received from various aid agencies and periodic grants are received from chemical companies to carry out applied research.

7.2.5 Functions and Services

WINBAN's functions fall into three broad categories.

Firstly, its marketing functions which include Contract negotiations and the monitoring of same. Specific areas dealt with include the negotiation of prices to be paid, incentives, UK import quotas, as well as the monitoring of production and forecasting such things as fruit supplies, fruit shrinkage, market prices and imports into the UK from other sources.

Secondly, research and development functions which concentrate on improving agronomic practices and postharvest handling of the fruit. Attention is given to such things as reassessment of fertilizer requirements and method of fertilizer application; improved technological package for small farmers; seasonal redistribution of banana production; moisture conservation; improved packing; development of crown-pads; nutritional and disease monitoring; carton testing; reducing postharvest losses, among others. Just as important, better ways are constantly being sought to transfer the appropriate technologies to the banana growers.

The third major function of WINBAN is one of consultation/coordination and transfer of technologies and experiences. The objective of this role is to smooth the production/marketing process as much as possible by attracting a flow of resources for development, coordinating such things as the tendering of input supplies, facilitating the maintenance of production levels and assisting in emergency situations affecting the industry.

The individual island Banana Growers' Associations are co-operative type organisations which coordinate and administer the exportation of bananas from the islands to the UK. They also provide a wide range of other services to banana growers, including a regular supply of inputs, leaf-spot disease control and extension. In an industry comprised of several thousand very small growers, these services are most economically provided through such organizations. The services provided by these Associations, as well as by WINBAN, are vital to the sustenance of the banana industry in the Sub-region.

7.2.6 Lessons learned

- 1) **There is strength in unity.** As any cooperative member will confirm there is strength in numbers and unity. Without a WINBAN type structure it is unlikely that the individual banana associations would have been able to survive the fierce competition in the world market. By working together the small islands have not only produced larger volumes of produce, which can be marketed as a single product, but they also create a demand for inputs which permit economies of scale in the purchase of agricultural inputs, packing materials and others.
- 2) **Integration is desirable.** The banana industry was responsible for creating conditions for the birth of WINERA cardboard box industry and for the development of crown pads. However, neither WINBAN nor the Banana Associations are shareholders in these two businesses. Horizontal integration within the banana sub-sector would likely lead to increased returns to this sub-sector.
- 3) **Continuity of supply is necessary.** Organized production by four countries for a specific market reduces the risks of losing that market because of adverse weather conditions in any one country or pest/disease problems. It is unlikely that all countries will be hit equally hard at the same time, thus joint marketing helps to assure continuity in supply.
- 4) **Increased returns accrue from unison.** When one voice speaks for several producers there is a much better chance of obtaining better contractual agreements and better overall returns for a given product.
- 5) **Disease control requires a continuous and organized effort.** Diseases such as leaf spot and moko can only be controlled through very extensive and expensive efforts and preventive measures in all the islands. This type of an effort requires effective support services which can best be provided by farmer organizations within each country and a central organizing body within the sub-region.
- 6) **Quality must be maintained in the marketplace.** Market share can only be obtained and maintained by supplying a quality product on a continuous basis. An organized effort must be on-going to identify constraints affecting pre and postharvest quality and to carry out the necessary research to identify economically viable solutions and to transfer those solutions to the users.

- 7) **Farmers are slow to adopt new practices.** Farmers in general are conservative and small farmers in the Caribbean are even more so. They will accept and introduce change only after they have observed with their own eyes that they can increase their net incomes by doing so. This process takes time and requires an effective extension program which, in turn, requires a permanent organizational structure. Such a programme is dependent upon a dynamic research effort.
- 8) **Economies of scale are required in providing services.** Research and technical assistance are very expensive and cannot be financed directly by the typical farmer of the Sub-region. However, large numbers of small growers organized into farmers organizations can effectively cover many of the costs of priority services. Even the smallest farmers are willing to spend money to make money and cess arrangements have proven to be an effective means of financing the necessary services.
- 9) **Government support is necessary.** Whereas governments cannot easily support individual farmers they can and do support organizations of farmers. This can be done through policy changes, tax benefits, donations of land or infrastructures, among others.
- 10) **Increased international support is beneficial.** The existence of a Sub-regional structure facilitates the channeling of human and financial resources from regional and international agencies. Development and donor agencies are much more likely to support a Sub-regional effort than an individual farmer or country effort.
- 11) **Banana growers attempt to maximize their returns.** As productivity increases, as a result of improved production and postharvest handling techniques, farmers are putting more and more land into bananas. Bananas are seen as the best way of maximizing net returns and until there is a negative change in market conditions it will be very difficult to get small farmers in Dominica, St. Lucia and St. Vincent to plant non-traditional tree crops, where bananas can be grown.
- 12) **Growing and marketing bananas is a full time activity.** Suggestions are made from time to time that WINBAN and the Banana Growers Associations diversify their activities into other tree fruits. At the present time available resources are hardly sufficient to meet the needs of the banana industry alone. Any attempt to include other non-banana fruits would tend to dilute WINBAN efforts on bananas and would risk doing harm to the banana industry.
- 13) **Banana marketing is a complex endeavour.** The marketing structure for bananas is more complex than for the non-traditional tree fruits. This is due in part to the trade protection afforded in the UK market, as well as the monopsonistic buying position of Geest and the requirements for specialised shipping space for green bananas and ripening rooms, in addition to the other factors characterizing fresh fruit marketing. Although growers are locked into a generally favourable arrangement, they clearly need representation in London to look after their interests. The monitoring and political role makes the

London representation of WINBAN distinctly different from conventional marketing. Marketing functions such as pricing, promotion, distribution and others are undertaken by Geest.

- 14) There is a great advantage in the little competition between islands in banana production. Since bananas are purchased on a Sub-regional basis and a protected market exists for all the quality bananas that can be produced, there is little competition between the islands for the same market. This is not the case in other tree fruits where exporters from different islands may be competing for the same ethnic markets.

PART III

STRATEGY AND PROPOSED ACTIONS

As was indicated at the beginning of this report, successful marketing necessitates being able to supply continuous volumes of quality produce at competitive prices, making the commodity available at the proper place on a timely basis. As was shown in the diagnosis, total fruit exports (excluding UK bananas) from the Sub-region, in 1985, amounted to 20,852 tonnes. Of this amount, 86% went to regional destinations and only 2,881 tonnes (14%) went to extra-regional markets, mainly the UK and Canada. Considering that this small volume (55 tonnes/week average) was shipped by numerous exporters from four countries and includes some 15 different fruits, the scope for joint marketing, from a volume perspective, does not presently exist. Although some may argue that exportable volume could be substantially increased, given market certainty, there will be a time delay of at least two years due to the need to both identify markets and to upgrade the necessary cultural practices to improve fruit quality so that it can become exportable. Although past development activities are likely to increase production of fruits, particularly citrus and mangoes, due to a series of production/marketing constraints at the national level, volumes suitable for export are not expected to increase greatly, if at all.

This negative picture of the present situation by no means implies that joint marketing from the Sub-region is not an attainable medium or long term goal. On the contrary, it is likely to be the only feasible solution, given the transportation constraint, since a reliable transportation network will require relatively large volumes of produce on a continuous basis.

To achieve joint marketing over the longrun will require the execution of a number of joint activities over the immediate and medium term. The realisation of marketing studies, crop zoning, germplasm banks, development of technological packages, training and project formulation, among others, are all activities which can best be undertaken as joint efforts. It is only through the execution of a series of integrated and well coordinated actions that the constraints identified at the national level can be overcome so that joint marketing will become an attainable goal at the Sub-regional level.

1. STRATEGY

The diagnosis identified production/marketing constraints and action areas to overcome them; by area (Sections II-1 to II-5), by country (appendices 1-4) and by commodity (Section II-6). The purpose of this section is to outline a strategy for overcoming the identified constraints which will allow the countries of the Sub-region to successfully reach their common national objective - diversification of agricultural production, through import substitution and export development - while at the same time improving the standard of living of small farmers.

The proposed actions will be developed at two levels: Sub-regional and country specific. In the first instance projects will be multi-national in nature and will be oriented towards the institutionalization of the necessary services to develop and maintain a dynamic fruit sub-sector. The types of actions envisaged include: establishing a satisfactory system of co-ordination

at the Sub-regional level; prioritization of fruits and production zones within the Sub-region; generation of the capacity to produce quality planting materials; development of information and plant protection/quarantine services; generation and transfer of appropriate technologies; strengthening of farmers organisations, and improved intra and extra-regional transport.

In the second instance the projects will be country specific and will be oriented to resolve priority problems related to the production and marketing of specific commodities for either export development or import substitution. Projects will include marketing strategies to improve domestic and/or export marketing, rehabilitation and/or top working of fruit trees, agro-processing, production for specific markets and others to be determined.

Before identifying the main elements of the strategy and how they relate to specific actions, it is necessary to analyse, albeit briefly, the requisites to achieve the diversification goal and to identify the different participants and their roles.

1.1 Requisites

1.1.1 Well defined policy framework

It is essential, if a self sustained diversification effort is to be implemented, that the private sector, particularly the small farmers and their organizations, have a clearly defined set of rules that will allow them to make the necessary production/marketing decisions related to diversification over the short, medium and long term.

1.1.2 Adequate technology

Because the four islands have been under production systems that are oriented towards exports, a dynamic sector around these crops has developed. Technology generation for other crops has lagged behind, to the point that currently there are no systems to even test locally, technological packages developed in other parts of the world. If a serious effort towards diversification is to be made, it becomes essential that a more effective system be established for transferring technologies to the small farmers of the sub-region.

1.1.3 Production capability

Production capability is a function of the crop characteristics, natural resource endowment of each island and its available human and financial resources. An analysis of these will facilitate the selection of commodities in which each respective country has comparative advantage.

1.1.4 Markets

One of the pivotal points to achieve the goals defined by the Windward Islands Governments is that of identification of markets and development of marketing channels. Not only is it necessary to identify and develop overseas markets, for commodities in which the respective countries have comparative advantages, but also internal markets, offering a sustained demand for non-exportable products.

1.1.5 Services and infrastructure

A minimum level of key services (credit, farm input supplies, information, technical assistance, and transport, among others) must reach producers on a timely and continuous basis if national goals are to be reached. Minimum physical infrastructure required for export development must be identified and put in place.

1.2 Participants and their Roles

In the definition of a realistic strategy it is necessary to clearly identify the principal participants involved in each of the areas defined above and their respective functions.

1.2.1 The Participants

Types of participants required to carry out a sub-regional fruit sub-sector development strategy can be differentiated by those making up the local private and public sectors and the external development organizations (Figure 2).

1.2.1.1 Private sector

Whereas some private sector entrepreneurs (large farmers) may have relatively easy access to information, credit and technical assistance, more costly services such as research/development and large physical infrastructure are normally beyond their means. Small farmers, on the other hand, tend to require a complete line of supporting services and infrastructure. These may be supplied either by government or by farmers organizations.

1) Large farmers

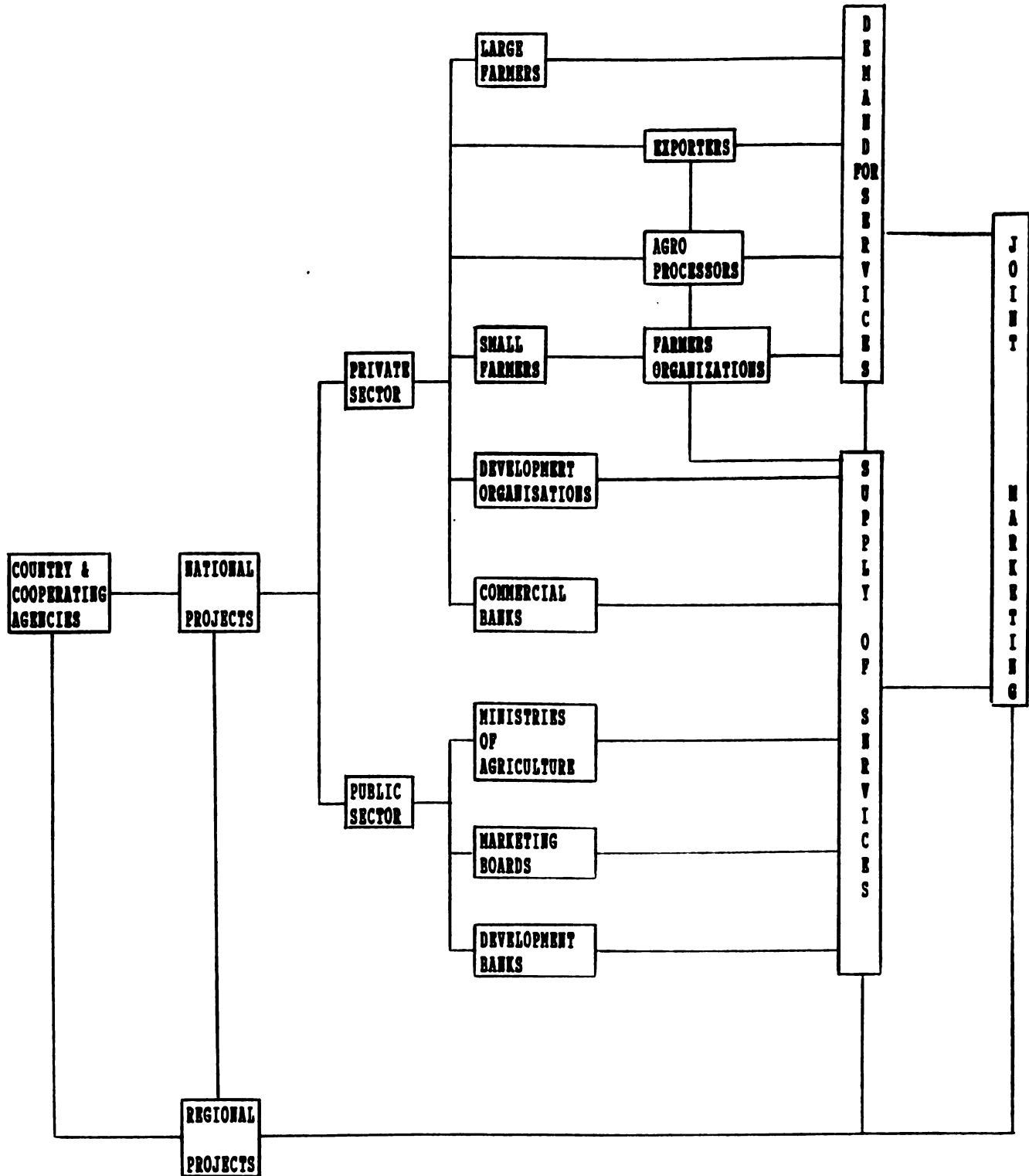
Large farmers, or estate operators, cannot be ignored in any systematic effort for developing an effective fruit production/marketing system. In the initial stages of any export activity they may well provide the bulk of production, thus serving both as the nucleus and catalyst for the development of regional and extra-regional markets.

2) Small farmers and their organizations

There are over 40,000 small farmers in the Sub-region and most of these operate less than five (5) acres of land. The majority are members of one or more farmers organizations which are actively involved in production and marketing of traditional crops, principally banana, cocoa, coconut and nutmeg.

A significant group of small farmers have traditionally produced staple food (fruits, vegetables, root crops) for local consumption and for sale to exporters. In recent years there has been increased interest in the organization of these small farmers to become more directly involved in the marketing of their produce.

FIGURE 2: PARTICIPANTS OF A SUB-REGIONAL FRUIT SUB-SECTOR DEVELOPMENT STRATEGY



A key element of this strategy will be to strengthen these organizations of small farmers so as to:

- develop the capacity to systematically produce and market specific crops efficiently;
- serve as a viable channel for reaching small farmers with priority public sector services;
- serve as a channel for obtaining small farmers participation in the definition of policies that might affect them, and
- involve small farmers more directly in domestic and intra or extra-regional marketing.

3) Development organizations

In each country of the Windward Islands there are specialized development organizations (NDF, NRDF) which provide basic services of different types to small farmers and organizations of small farmers. These should be strengthened and utilized in any attempt to promote the systematic production/marketing of non-traditional produce.

4) Commercial banks

Commercial banks are often key factors in development. They should be stimulated to provide additional lines of credit for agricultural production and marketing, particularly for larger scale farmers and exporters.

1.2.1.2 Public Sector Institutions

Government has traditionally been in charge of the delivery of production and marketing services to the sector. In fact, the Ministries of Agriculture (MOA) and the marketing institutions have been committed to providing services for which they do not have adequate resources. While trying to provide a broad range of services they do so with a low level of efficiency.

Under this proposed strategy the constraint of "limited resources" would be accepted as a given feature of the system and an effort would be made to identify and strengthen priority services in which the respective institutions have comparative advantages. Emphasis would be given to removing staff deficiencies and improving staff efficiency and specialization in priority areas which cannot be serviced by the private sector. Services which might be more readily provided by the private sector would be transferred to the respective organizations. Government would continue to play a key role in the definition of policies, project monitoring and co-ordination with donor agencies. Government Development Banks will be active participants and new channels and strategies will be developed to effectively reach small farmers with necessary capital.

1.2.1.3 External Development Organisations

The Sub-regional nature of the proposed strategy will require a multinational operational component. This is essential for the implementation of the strategy since the production capacity precludes the self-sustained development of a country by country approach to market devel-

opment. Regional and international organizations have comparative advantages in providing some types of services, financial resources and technical assistance on a multi-national basis. They might also provide a coordination function for multi-national activities or projects, thus reducing costs to individual governments.

1.2.2 The Roles

1.2.2.1 Policy definition

Government will continue to have the overall responsibility for the definition and coordination of national development policies and for the monitoring of on-going projects. However, other groups, e.g. commodity and farmers organizations, should be more actively integrated into policy definition. Properly structured within the system they provide an ideal channel to support diversification.

1.2.2.2 Technology generation and transfer

Although the generation of agriculture technology has traditionally been in the hands of Government, in the Windward Islands the stimulation of regional efforts has led to the demise of national agricultural research systems (NARS) and governments have largely lost control of technology generation and transfer. For export development, an effective programme for the generation and transfer of commodity specific technology must be put in place. This is most likely to occur through an integrated effort of government (NARS), farmers organizations and regional/international organizations, using a commodity systems approach with a market orientation.

1.2.2.3 Production

In the Windward Islands the production of non-traditional export commodities and domestic food crops is in the hands of small farmers. However, a relatively high proportion of the land is controlled by a few large land owners and Government. Governments are attempting to rectify this situation through a redistribution of the land and the development of family (model) farms. Simultaneously, governments are also trying to stimulate large land owners to move into the production of non-traditional crops. Therefore, there seems to be complementary and active roles for all three participants: small farmers, large farmers and government, in any export development activity.

1.2.2.4 Marketing

Marketing of traditional export crops has been carried out by commodity groups, often in association with some multinational firm. For example the case of WINBAN and Geest in bananas, and Cocoa Growers Associations with multi-national buyers of cocoa. Food crops for domestic consumption traditionally have been marketed by farmers themselves and by hucksters/traffickers who operate in both the domestic markets and in inter-island trade. Attempts by governments to market fresh produce through marketing boards have met, in general, with dismal failure. Governments are beginning to recognize their role in marketing as one

of "facilitator" and are tending, more and more, to leave the hands-on operations to the traditional traders and a growing number of non-traditional exporters. Non-traditional farmers organizations, made up of small farmers, are emerging as a potentially important element on the marketing scene. They are beginning to show interest and capacity for direct involvement in the marketing of perishables, however, they will need substantial assistance in upgrading the services required by their members.

1.2.2.5 Services and infrastructure

Commodity organizations presently play an important role in the delivery of certain services, e.g. input supplies, information, marketing, some technical assistance and as a channel for production credit. Governments have been most effective in providing technical assistance, some information and in the provision of infrastructure. Whereas Governments will continue to be the principal source for infrastructure, it is expected that more of the basic services will be channeled through farmers organizations. Development banks will continue to be the principal supplier of credit but new models for channeling the credit to small farmers must be introduced, lest the funds continue to be underutilized.

1.3 Elements of the Strategy

1.3.1 Sub-regional approach vs Country approach

The size of these island-states, measured in terms of territorial area, population and production capacity, suggests a Sub-regional approach to obtain economies of scale. This approach is further justified on two grounds:

- 1) Each of the four Islands has defined the promotion of non-traditional agricultural products for export as a key element of their developmental efforts for the near future, and
- 2) From the point of view of regional and international organizations, a Sub-regional approach would allow economies in the design and delivery of services and assistance.

However, on the other hand, there are certain constraints which only affect one country and perhaps one commodity in a specific country. Local decision makers often have priorities different from those in neighbouring countries. Local problems and immediate needs cannot await solutions on a Sub-regional level. Therefore, any Sub-regional strategy must include national components to resolve particular problems and interests.

1.3.2 Markets

Fruit production in the Windward Islands is characterised by a series of particular factors negatively affecting product quality, productivity and costs of production. To overcome these and increase the region's competitiveness on the world market will require considerable

innovation and change. Given this situation, the strategy calls for giving priority to tourist, intra-regional and ethnic markets, initially, with a gradual phasing into extra-regional markets, concentrating on "market windows" and speciality markets.

1.3.3 Building on past initiatives

A large number of positive experiences have been earned over the years and throughout the Sub-region. In some cases these experiences deal with production or marketing by farmers or farmers organizations. In others they may be institutional experiences for channeling improved services to farmers through development foundations or agencies or MOA attempts at increasing production through increased plantings of fruit trees. This element of the strategy is oriented towards the formulation and execution of actions to obtain results over the shortest time span possible. For example, training of technicians and farmers, improved spraying, fertilization and pruning, tree rehabilitation and top working are all ways to produce larger volumes of exportable produce in relatively short time periods.

1.3.4 Farmers organisations

It is believed that the direct participation of small farmers in shaping policies and decisions that, directly or indirectly, affect their livelihood, will go long towards increasing the chances for successful attainment of development goals of the countries. This active participation can be best achieved through farmers organisations. The success of commodity marketing, particularly in the case of bananas, could not have been achieved without the existence and active support of farmers organisations. The strategy therefore gives priority to the strengthening of farmers organisations within the Sub-region as a key element in developing longterm and permanent production and marketing capacity of non-traditional fruits.

1.3.5 Strengthening key public sector services

Public sector institutions of the sub-region must begin living within the bounds of their available resources. Plans do not beget results unless they are implemented, and with a fair degree of efficiency. Given the limited human and financial resources within the MOA and the Marketing institutions, priorities must be established both on a commodity basis and in service areas. Priority areas for improved services necessary to reach the sector objectives will be identified and projects formulated and implemented to achieve development.

It has become apparent that Governments cannot provide all the services that are required for the development of agricultural exports. Given this reality, it is necessary to develop an approach that allows for a more active role of the private sector, including farmers organizations, in providing services for which they have comparative advantage.

1.3.6 New development areas

In addition to strengthening on-going activities, farmers organisations and key public sector institutional services, and improving the co-

ordination/collaboration between donor agencies, it will be necessary to initiate actions in areas here-to-fore untouched, or insufficiently so, by developmental projects. Under this strategy these priority areas will be identified and projects will be formulated and executed in an effort to eliminate identified constraints.

1.3.7 Improving donor agency collaboration and coordination

Developmental agencies are sometimes inadequately oriented and supported in carrying out their developmental efforts. With over 50 active international and private organizations contributing to the development of one or more of the Windward Islands, and with the scarcity of Government counterparts and skilled professionals, national personnel often find that a significant part of their time is spent receiving visiting missions. Follow-up becomes near impossible because as one mission leaves, the next arrives. Each agency has its own projects and there is little or no collaboration with other agencies, even when two projects may be complementary.

In reality, effective co-ordination/collaboration between organisations occurs only when self-interest exists on both sides. In this element of the strategy, self-interest will be introduced by getting the diverse agencies to agree to support a Sub-regional approach for the development of the fruit sub-sector in the Windward Islands. Under this joint effort governments and participating agencies will identify specific components to support. Each would continue to operate within its own structure and according to its own volition but all would have a common goal towards which they would strive.

1.3.8 Summary

In summary, the Sub-regional strategy for the development of the fruit sub-sector in the Windward Islands will be market oriented, giving priority to a few selected commodities for which the Sub-region has comparative advantage for production. To assure the development of the necessary services, attention will be given to institution building activities within the public sector and at the level of farmers organizations. Development agencies will be asked to play a key role in the implementation of the strategy through the funding of selected projects and activities which will be executed by either private or public sector institutions. A Sub-regional committee will be established to ensure effective coordination, monitoring and evaluation.

1.4 Projects and Activities Conforming the Strategy

The diagnosis (Part II) permitted the identification of the major areas requiring action to overcome the production/marketing constraints. These have been summarised in Tables F-1 to F-5, by country. These "major areas requiring action" are differentiated into those considered priority and those for which some corrective actions are presently underway. The analysis of these priority areas permitted the design of the plan of action presented in Table F-6.

The first column of Table F-6 summarizes the "priority constraints" identified during the diagnosis. The second column presents a listing

of "actions to be taken" as part of a Sub-regional strategy for the development of the fruit sub-sector. The third column indicates those institutions which are presently carrying out activities in the respective action areas. A blank space therefore indicates action areas where no present institutional activities are under way. Finally, Table F-6 summarizes the present status of the diverse actions, identifying whether the action is "underway" or "in-pipeline," whether a "project profile" exists or not for the specified action and what is "needed" to develop the action, e.g. decision, project formulation, financing, preparation of terms of reference, study or follow-up.

Although it's possible that some necessary actions have been overlooked during this exercise, an attempt was made to include all of the priority actions, including projects and decisions, that will be necessary to successfully implement a fruit sub-sector development plan, under a Sub-regional strategy. For those priority actions for which there appear to be no on-going or in-pipeline activities underway, project profiles were prepared.

In those cases where development organizations are presently executing or planning specific actions directed to overcome some of the identified constraints, e.g. CARICOM/CIDA regional market information project, project profiles were not prepared. The reasoning behind this is that an attempt should be made to build upon existing interests and experience and not produce another proposal which could prove redundant or conflictive. This does not necessarily mean that projects and proposals in the design stage are not in need of modification and improvements.

The rest of this section (1.4) will be dedicated to commenting on the five sub-divisions of Table F-6.

1.4.1 Macro-Environment and Organisational Structure

Most of the actions falling within this area have to do with either decision making or institution building. The five actions indicated with an * (A-1, A-3, A-4, A-5, A-8) will require government decisions at the initial stage of implementation of a Sub-regional strategy. The three actions (A-1, A-2, A-9) indicated in bold face type are included in Project Profiles 1, 2 and 6, respectively.

In respect to "information" (A-5), some planning actions are presently underway. IICA is designing a project to identify information needs at the level of small farmers and to prepare computer software for the management of this type of information. This action will complement the CARICOM/CIDA proposal to upgrade public sector marketing information services and to create a regional marketing information network. Decisions and financing for both these actions are yet to be made and allocated.

The two actions A-6 and A-7 are training activities which will be included in specific projects or for which specific actions can be designed.

In the case of the restructuring of marketing boards (A-8), actions are already underway in Dominica, with the creation of DEXIA, however, there is a need for follow up actions in Dominica and the definition of national marketing strategies in each of the other islands.

Farmer organisations will play a crucial role in the development of the non-traditional fruit sub-sector. The IICA is presently designing a multi-national project to strengthen the organisation of small and medium size farmers (A-9). An analysis of WINBAN experiences (A-10) may contribute to the design of projects which will help shorten the developmental period of farmers organisations.

Actions A-11 and A-12 are oriented towards improving services for hucksters and exporters. In the former case OAS and FAO have initiated some activities although additional support will be required. In the case of exporters there is a need for the identification and formulation of specific projects to strengthen this group.

1.4.2 Pre-production, Production and Harvesting

The production of quality fruit begins with the production of planting material. Fruit quality varies with the level of cultural and harvesting practices. Relatively few actions are presently underway within the Sub-region which impact favourably upon nursery management and cultural practices. For this reason project profiles 3, 4 and 5 were prepared. These correspond to needed actions indicated in bold face type, primarily B-1 through B-5.

In the case of research on fruit pests, studies to determine the existence of fruit flies are presently underway in St. Vincent and Grenada and are in the planning stage for St. Lucia and Dominica. In the case of the mango seed weevil a reconnaissance mission is underway, sponsored by FAO. A workshop is scheduled for June, 1987 to discuss the results of the mango seed weevil study, the present state of knowledge and future research needs. It is quite probable that an additional and more in-depth analysis will be required before an action program can be developed. Additional research to identify other pests and diseases of economic significance will be necessary.

Although both FAO and IICA have on-going activities to strengthen MOA institutional capacity to identify, control and prevent the introduction of pests and diseases to individual countries, additional institution building actions, e.g. training, organization and research, will be necessary.

1.4.3. Postharvest Handling of Fruits

Projects will be formulated at the country level for the systematic production and marketing of priority crops destined for agro-processing or for fresh produce exports. These projects will facilitate identification of the minimum needs for postharvest infrastructure as indicated in C-1.

Profile 5 will generate the necessary technological information to train extensionists, farmers and exporters in improved postharvest handling practices (C-2).

Both CATCO and FAO are presently carrying out some activities aimed at improving the use of standards within the Region (C-3). FAO is also evaluating needs for improvement of wharf facilities for the huckster trade (C-4). Additional research will be required in each country on specific problems and potential, e.g. domestic transport, existing IBD and other infrastructure.

In respect to training of personnel in postharvest handling (C-5), a course is presently being organized for 16-20 participants from the Eastern Caribbean. This is a joint effort of PIP, UCD, AID, FAO and IICA. This training will be conducted during five weeks in August-September, 1987 and will use a commodity systems approach in training, it is expected to generate commodity project profiles as final outputs.

1.4.4 Domestic Marketing

To overcome the domestic and export marketing constraints integrated marketing strategies (D-1) should be developed. Although improved marketing is considered high priority by all governments within the Sub-region, relatively few actions are presently underway to develop marketing systems. One exception is St. Lucia where government has offered to turn over the marketing board facilities (D-4) to STAFCO-OP, a second level farmers organization. Where conditions permit, similar type projects should be developed in the other countries to get the private sector more actively involved in domestic marketing.

Additional research (D-2) is necessary to determine the demand of the tourist trade and local supply capabilities. A realistic prioritization of commodities for import substitution must be undertaken. This will entail governmental decisions and the designation of teams of technicians to undertake the evaluation.

Specific projects will be formulated in each country where conditions warrant the development of plant size agro-industries (D-3).

1.4.5 Export Marketing

Major actions underway in respect to export marketing include: CATCO's efforts to increase exports from the Region; the HIAMP effort to achieve a private sector lead agricultural production, marketing and export industry in the Eastern Caribbean, and FAO's project to reduce postharvest losses, which includes upgrading of schooners used in the huckster trade (E-4). Specific country activities will complement these actions by designing production/marketing projects along commodity lines, with the intention of increasing the availability of quality produce for particular markets over the short and medium term (E-1). Profile 2 will generate information on external markets, necessary for the prioritization of fruits and the formulation of final projects. It will also evaluate the impact that Trinidad/Tobago and Barbado's import substitution programmes are likely to have upon the Sub-region (E-2).

Adequate transport from the Region continues to be the principal bottleneck in export marketing. Additional effort must be made to evaluate existing transportation models and to design a project to overcome this constraint (E-3). An evaluation of the Farm-to-Market (Dominica) intra-regional marketing experience, as well as the economic feasibility of inter-island shuttling of fresh produce (E-3) are two actions which will provide useful information towards the design of a solution.

1.4.6 Summary of Actions Conforming the Sub-regional Fruit Development Strategy

Table F-7 summarizes, by area, the required actions identified in Table F-6. These actions form the basis for a Sub-regional fruit development strategy and can be systematically organized into projects. The first column indicates the major policy decisions to be made for the Sub-regional strategy to be implemented. These decisions will be made by the respective governments through their public sector institutions. Other projects and/or activities requiring decisions by government or public sector institutional leaders are indicated in the remaining four columns in bold face type.

Table P-1: Major Areas Requiring Action in Respect to Macro-environment and Organisational Structure

Major Areas Requiring Action	Dominica	Grenada	St. Lucia	St. Vincent	Sub-Region	Reference Source Table or Document
Determining Crop Priorities:						
- Market analysis for priority crops (fresh & processed)	P	P	P	P	P	II-6
- Survey of actual acreage/production of priority crops	P	P	P	P		Country conclusions
- Identification of best production areas for priority crops	P	P	P	P	P	Country conclusions
Policies & Agreements:						
- Clarification of policy on land use	P	P	P	P		A-4 to 6 Country conclusions
- Clarification of policy on information systems	P	P	P	P	P	A-18 Country conclusions
- Clarification of policy on plant propagation	P	P	P	P	P	B-1 to B-4 Country conclusions
- Clarification of policy on generation/transfer technology	P	P	P	P	P	A-8 Country conclusions
- Clarification of support towards farmers organizations and their relationships with international organizations	P	P	P	P		same
- Clarification of credit policies to small farmers	P	P	P	P		same
- Definition of policy on agro-processing	C	P	P	P		same
- Definition/clarification of marketing policy	P	P	P	P	P	A-17, Country conc.
- Agreements with donor & international agencies to concentrate resources in complementary areas favouring priority crops	P	P	P	P	P	Country conclusions A-10, A-11
- Definition of sub-regional information system on macro-environment	P	P	P	P	P	Country documents
Organizational Structure:						
- Private sector:						Country documents
.strengthen management capacity of farmers organizations	P	P	P	P	P	Country conclusions A-12, A-13
.facilitate access to credit through farmers organizations	P	P	P	P		Country conclusions
.extend network of farm input supply stores	X	X	X	X		A-12, A-13. C.cons.
.training of tech. staff in postharvest & marketing	P	P	P	P	P	Country conclusions

continuation of Table F-1

Major Areas Requiring Action	Dominica	Grenada	St. Lucia	St. Vincent	Sub-Region	Reference Source Table or Document
.upgrading of f.o. infrastructure for postharvest handling of perishables	X	X	X	X		C-1, C-2, D-5
.integration f.o. into more active domestic marketing	X	X	X	X		Country conclusions
.exchange experiences between farmers organizations	X	X	X	X	X	Country conclusions Country documents
.support on-going efforts for joint marketing via farmers organizations	P	P	P	P	P	Country conclusions
.improve communication between f.o. and donor agencies	X	X	X	X	X	A-10, A-11
.improve communication of WINBAN/CATCO experiences to non-traditional f.o.	X	X	X	X	X	
.evaluate & extend where feasible WRDF experience in channeling credit to f.o.			X		X	St. Lucia conclusions
.extend the use of computer software in managing production/market/trade data	X	X	X	X	X	same
.form/support huckster associations	C	X	X	C	X	country conclusions
- Public Sector:						
Ministries of Agriculture:						
.determine priority areas for concentration of technical staff	P	P	P	P		A-15, A-18 Country conclusions
.upgrade supply/demand information services	P	P	P	P	P	A-18
.training in monitoring and forecasting	P	P	P	P	P	A-18, Coun. documents
.improved integration between f. o. and extension agents	C	X	X	X		A-18, Country conc.
.facilitate priority research on priority crops	P	P	P	P	P	Country conclusions
.facilitate imports/distribution of farm inputs	X	X	X	X	X	A-12, A-13, C. con.
.train personnel in postharvest handling of perishables & marketing	C	C	C	C	C	A-15, A-18
.training in project formulation	C	C	C	C	C	Country conclusions

continuation of Table P-i

Major Areas Requiring Action	Dominica	Grenada	St. Lucia	St. Vincent	Sub-Region	Reference Source Table or Document
Marketing Institutions:						
.development of following facilitating services:						
-information	P	P	P	P	P	A-17, C. concl.
-training	P	P	P	P	P	same
-product promotion	P	P	P	P	P	same
-definition of standards					P	same
-trade representation					X	same
-import packaging material	X	X	X	X	X	same
.transfer hands-on operations of perishables to private sector						
	X	X	X	X		Country conclusions

Source: IICA research

Notes: x = major areas requiring action.

p = priority areas requiring action.

c = major areas requiring action but where corrective actions have been initiated.

f.o. = farmers organizations.

Country conclusions are found in annex.

Country documents are the baseline documents prepared by IICA/MOA in each country.

Table P-2: Major Areas Requiring Action in Respect to Pre-production, Production, Harvesting

Major Areas Requiring Action	Dominica	Grenada	St. Lucia	St. Vincent	Sub-region	Reference Table or Document
Preproduction:						
-Infrastructure & equipment:						
.major repair work nurseries	X		C	X		B-1
.upgrading of propagation facilities	X		X	X		B-1
.nursery equipment	P	X	P	P		B-1
.satelite nurseries		P	X			B-1
.multinational fruit germplasm bank	P	P	P	P	P	B-3
-Planning:						
.nursery targets based on real demand & crop priorities	P	P	P	P	P	B-1
.improved distribution system for plants	P	P	P	P		B-1
-Policy & technical decisions:						
.study of costs of plant propagation	C	X	X	X		Country conclusions
.definition & enforcement of nursery standards	P	P	P	P	P	B-2
.initiation of citrus virus indexing programme	P	P	P	P	P	B-3 & country conclusions
.improvement museum plots	P	P	P	P	P	Country conclusions
.introduction/testing of new citrus rootstocks	X	X	X	X	X	Country conclusions
-Training:						
.nursery management	P	P	P	P	P	B-1 & B-2
.propagation techniques	P	P	P	P	P	B-2
.production of disease free plants	P	P	P	P	P	Country conclusions
Production & Harvesting:						
-Policy, planning & technical decisions:						
.determination of crop & cultivar priorities	P	P	P	P	P	Country conclusions
.determination acreage/yields of existing stands	P	P	P	P	P	B-11, B-12, B-13
.planning production to meet demand	P	P	P	P	P	Country conclusions
.introduction of new species &/or cultivars	X	X	X	X		B-4
.zoning with different fruit species	P	P	P	P	P	Country conclusions

continuation of Table F-2

Major Areas Requiring Action	Dominica	Grenada	St. Lucia	St. Vincent	Sub-region	Reference Table or Document
continuation of policy,						
planning & technical decisions:						
.survey of pests/diseases and their economic implication on fruit crops	P	P	P	P	P	B-7, B-8, B-9
.applied research to support fruit production	P	P	P	P	P	Country conclusions
.development of technological packages fruit tree production	P	P	P	P	P	Country conclusions
.make available necessary inputs at minimum cost	X	X	X	X	X	B-14
.improve technology transfer to farmers	P	P	P	P	P	Country conclusions
.selection & characterisation of best local fruit clones	X	X	X	X	X	B-4 & country conclusions
.change to desirable cultivars thru topworking	X	X	X	X		Country conclusions
.study, control, eradicate mango seed weevil	P		P		P	B-7, B-8, country conclusions
.survey fruit flies	P		P		P	
-Training:						
.fruit production/orchard management	P	P	P	P		Country conclusions
.positive/negative aspects of intercropping	P	P	P	P		B-6
.pest/disease control on fruit crops	P	P	P	P	P	B-6
.promotion of high quality cultivars among farmers	X	P	P	P		B-4
.topworking techniques	X	X	X	X		Country conclusions
.use of windbreaks in priority areas	P	P	P	P		B-6
.proper harvesting methods & maturity indices	X	X	X	X		B-15
.yield forecasting	X	X	X	X		

Source: IICA research.

Notes: x = major areas requiring action.

p = priority areas requiring action.

c = major areas requiring action but where corrective actions have been initiated.

Country conclusions are found in appendices 1 to 4.

Country documents are the baseline information documents prepared by IICA in each country.

Table F-3: Major Areas Requiring Action in Respect to Postharvest Handling

Major Areas Requiring Action	Dominica	Grenada	St. Lucia	St. Vincent	Sub-region	Reference
-Prioritization of fruits for export development	p	p	p	p	p	Country docu./conclus. II-6
-Determination of minimum post-harvest infrastructure needs for priority fruits	p	p	p	p	p	C-1, C-2, C-3
-Feasibility study of IBD in each country to determine potential use for postharvest handling of non-banana fruit	x	x	x	x		C-2, WINBAN
-Evaluation of seaport freezing facilities for use in cooling or freezing of fresh fruit			x			C-2
-Evaluation of marketing board facilities for use in domestic and export marketing	c	c	x	x		C-2
-Improved or new wharf facilities	c	c	c	c		Country documents
-Economic analysis of shuttling of fresh produce from other islands to St. Lucia for extra-regional export	x	x		x		
-Evaluation of domestic system of transportation of fruit and needs for modification	x	x	x	x		Country documents
-Development and/or adaptation of appropriate technologies for harvest & postharvest	p	p	p	p	p	Country documents
-Definition of standards: labeling, weights, sizes of containers, etc.					p	Country documents
-Evaluation of crop systems and determination of post-harvest losses/causes	x	x	x	x		Country documents

Source: IICA research. Country conclusions are found in appendices 1 to 4. Country documents are the baseline information documents prepared by IICA in each country.

Notes: x = major areas requiring action.

p = priority areas requiring action.

c = major areas requiring action but where corrective actions have been initiated.

Table 4-4 Major Areas Requiring Action in Respect to Domestic Marketing

Major Areas Requiring Action	Dominica	Grenada	St. Lucia	St. Vincent	Sub-region	Reference
-Definition of domestic market strategy based on imports & demand for fruits/fruit products from hotels and cruise ships	X	X	X	X	X	Country documents
-Developing mechanisms to bridge the gap between produce chemist laboratories and industrial application of them	p	p	p	p	p	D-4, D-5 Country documents
-Identification of external markets for processed fruits for which Sub-region has comparative advantage	p	p	p	p	p	Country documents
-Formulation of specific projects for the production/processing of specific fruits	p	p	p	p	p	Country documents
-Formulation of specific projects to involve farmers organisations in dynamic hands-on marketing of perishable commodities	p	p	p	p	p	Country documents

Source: IICA research. Country conclusions are found in appendices 1 to 4; Country documents are the baseline information documents prepared by IICA/NOA in each country.

Notes: x = major areas requiring action.
p = priority areas requiring action.

Table P-5: Major Areas Requiring Action in Respect to Export Marketing

Major Areas Requiring Action	Dominica	Grenada	St. Lucia	St. Vincent	Sub-region	Reference Tables/documents
-Identification of priority services to be provided by public sector and formulation of proposals to create or strengthen these services	P	P	P	P	P	Country documents
-Establish mechanisms to channel facilitating services to private sector:						
. farmers organizations	X	X	X	X	X	Country documents
. hucksters/traffickers	X	X	X	X	X	Country conclusions
. other exporters	X	X	X	X	X	
. regional/extra-reg. importers	X	X	X	X		
-Assess regional & extra-regional demand for selected commodities					P	E-4, E-5, E-6, E-7
-Definition of strategies for the organized production & marketing of selected crops	P	P	P	P	P	Country documents E-6 to E-10
-Formulation of pilot projects for the organized production and marketing of:						E-6, E-7
. mangoes	P	P	P	P	P	
. breadfruit	P	P	P	P	P	
. plantain	P	P	P	P	P	
. non-UK bananas	P	P	P	P	P	
. selected exotics	P	P	P	P	P	
-Support non-traditional farmers organizations in their efforts to develop joint marketing systems, including shipping	P	P	P	P	P	Country conclusions Country documents
-Organize regional workshop to analyze alternative models to overcome the transportation bottleneck to regional/extra-regional markets and formulate projects					P	
-Analyze Trinidad and Barbados markets and potential impact of national import substitution efforts on inter-island trade	X	X	X	X	X	E-4, E-5

continuation of Table P-5

Major Areas Requiring Action	Dominica	Grenada	St. Lucia	St. Vincent	Sub-region	Reference Tables/documents
-Review of CATCO's role within the Sub-region and re-definition of services to be provided to farmers organizations	P	P	P	P	P	

Source: IICA research. Country conclusions are found in appendices 1 to 4. Country documents are the baseline information reports prepared by IICA/MOA in each country.

Notes: x = major areas requiring action.
p = priority areas requiring action.

Table F-6: Summary of Priority Constraints, Actions to be Taken, Assisting Institutions and Present Status of Actions

PRIORITY CONSTRAINTS	ACTIONS TO BE TAKEN	ASSISTING INSTITUTIONS	PRESENT STATUS OF ACTIONS	
			Under-way	In-pipe-Project profile needed
A. MACRO-ENVIRONMENT & ORGANISATIONAL STRUCTURE:				
1) There are a wide variety of national, regional and inter-national organisations interested or involved in import substitution and export development. Although these contribute considerable resources towards diversification, much of the potential impact is lost due to lack of coordination and lack of a defined common strategy.	* Form Sub-regional commission to oversee the formulation of a sub-regional strategy for export development of selected fruits and to define the respective role of each participating organisation.		IICA(1)	D/P
2) Priority crops & targets undetermined	- Market identification, crop surveys and zoning.		IICA(2)	D/P
3) Lack of clear policies at national level in following areas: landuse, information systems, plant propagation, role of farmers organizations, generation/transfer technology, credit for small farmers, agro-processing, marketing, import controls, support role of donors,	* Each national government must evaluate its respective situation, priority crops and targets and clarify these policies which may inhibit the satisfactory development of the Sub-regional strategy.			D
4) Limited resources have public sector institutions spread too thin, i.e. trying to do too much with too little.	* MOA and marketing boards will select priority areas for concentration of services so as to improve efficiency.			D
5) Information on supply/demand of crops is insufficient for efficient planning and marketing.	- Diagnosis of information needs at level of small farmer	- IICA	IICA(3)	D/S
	- Design of information systems to satisfy these needs.	- IICA	IICA(3)	S
	* Upgrading of public sector information service.	- MOA/CARICOM/CIDA	CIDA(4)	D/S
	- Establishment of regional information network.	- CARICOM/CIDA	CIDA(4)	D/S
6) MOA lack expertise to monitor crop production & forecast supply.	- Training of personnel in monitoring and crop forecasting.			P/S
7) MOA personnel lack expertise in project identification and formulation.	- Training in project formulation using a commodity systems approach.	- IICA	IICA(5) IICA(6)	PU

continuation of Table F-6

PRIORITY CONSTRAINTS	ACTIONS TO BE TAKEN	ASSISTING INSTITUTIONS	PRESENT STATUS			
			Under-way	In-pipe-line	Project profile	Action needed
8) Marketing boards are not meeting their intended objectives. Marketing efficiency in handling perishables is very low.	* Marketing boards will be restructured to reduce hands on handling of perishables and improve the efficiency of their facilitating services (information, market identification, bulk purchasing of packaging, training, standards, phytosanitary requirements of importing countries. etc.).	- MB, MOA, BDD, TORI	DO(7)			P PU
9) Weak management capacity of farmers organisations.	- Systematic strengthening of selected farmers organisations in the Windward Islands through training, production/marketing projects, credit programmes, and others.	- MOA, IICA,			IICA(8)	D/P
10) There are few examples of successful models of joint marketing arrangements in the Sub-region.	- Analysis of the stages of development of WINBAN.					T/S
11) Hucksters have limited access to capital, information, training, packing/storage facilities and other facilitating services	- Formation of Huckster associations in Grenada and St. Lucia. Provide services through associations.	- OAS, FAO	OAS(9) FAO(10)			P PU PU
12) Private sector exporters lack organisation and access to operating capital.	- Organisation of exporters. - Establish lines of credit.	- HIAMP				P
B. PREPRODUCTION, PRODUCTION AND HARVESTING:						
1) Several of the plant nurseries within the sub-region lack the necessary facilities/equipment to produce quality plants	- Efficiency of selected nurseries will be upgraded so as to be able to meet national demands for quality plants.	- MOA, FAO, USAID, IICA	SL(11)		IICA(12)	D/P
2) Poor condition of museum plots and spread of pests and diseases through nurseries. High risk of introduction of pests/diseases from outside region by repeated introduction of planting material.	- Multinational germplasm bank will be established in one of the countries of the region.				IICA(13)	D/P
3) Plant production within the nurseries does not coincide with national priorities and farmers needs.	- Improved coordination between planners, farmers and nursery managers. - Train nursery personnel in proper planning.				IICA(12)	D D/S

PRIORITY CONSTRAINTS	ACTIONS TO BE TAKEN	ASSISTING INSTITUTIONS	PRESENT STATUS	
			Under-way	In-pipe-Project profile Action needed
4) The quality of fruit plants released by the nurseries is highly inconsistent and cannot be guaranteed. For some species the supply is frequently less than the demand.	- Definition and enforcement of standards.			IICA(12) D/P
	- Virus indexing programme.			IICA(12) D/P
	- Establishment of budwood registration and certification programme.			IICA(12) D/P
	- Improvement of nucleus plots.			IICA(12) D/P
5) Insufficient technical information is made available to the farmer for the efficient production and marketing of non-traditional fruits.	- Training of nursery personnel in nursery management, propagation techniques and disease prevention and control.			IICA(12) D/P
	- Programmed and organized research on priority problems of selected commodities.			IICA(14) D/P
	- Development of technological packages for the production/marketing of selected fruits.			IICA(14) D/P
6) Insufficient information on the whereabouts, characteristics and economic implications of certain pests.	- Training of extensionists and farmers in the proper use of tech-packs.			IICA(14) D/P
	- In depth analysis of characteristics of the mango seed weevil and methods for control.	- NDA, FAO, IICA	FAO(15)	D/P
	- Determination of the existence and extent of fruit flies within the Sub-region.	- NDA, USDA, IICA, USAID	SV/GR(16) SL/DO(17)	D/P
7) Insufficient information on the present condition of selected tree crops and the potential for increasing their production.	- Identification of other pests/diseases of quarantine and economic significance.	- NDA, IICA, OWT, FAO		D/S
	- Surveys and inventories of breadfruit mangoes and citrus to evaluate potential for top working and/or rehabilitation.			D/S
C. POSTHARVEST HANDLING OF FRUITS:				
1) Infrastructure requirements are unknown since crop priorities and targets have not been determined.	- Once governments define priority crops and targets, production/marketing projects will be formulated. These will help to determine the minimum needs for postharvest infrastructure.			IICA(18) D/P

PRIORITY CONSTRAINTS	ACTIONS TO BE TAKEN	ASSISTING INSTITUTIONS	PRESENT STATUS			
			Under-way	In-pipe-line	Project profile	Action needed
2) Farmers and exporters do not have access to available and adequate technologies for harvesting and postharvest handling of perishables.	- Appropriate technologies will be identified and transferred to the Sub-region through training programs.	- FAO			IICA(14)	D/P
3) Excessive variations in standards of fresh produce exported from the region.	- Minimum-maximum standards will be recommended for produce from Eastern Caribbean (labels, weights, sizes, etc.)	- CATCO,FAO	CATCO(19) FAO(10)			PU PU
4) Insufficient information is available to make good decisions in respect to the proper use of existing infrastructure and best handling and transport methods.	- Additional research on the following subjects: - potential use of IBD each country - required improvements in wharfs and port facilities. - evaluation of domestic transport	- FAO	FAO(10)			D/S
5) Lack of trained people in post-harvest handling of perishable commodities and marketing	- Formal and in-service training.	- FAO,IICA, PIP,UCD USAID	FAO(10)	IICA(6) AID	IICA(14)	D/P PU
D. DOMESTIC MARKETING:						
1) Existing marketing boards are ineffective in hands-on marketing of perishable produce.	* An integrated domestic marketing strategy will be formulated for each country.					P/PU
2) Even though domestic markets are small, opportunities exist which are not being developed.	- Demand/potential supply studies oriented to tourist industry will be undertaken.					T/S
	* Commodities will be prioritised for import substitution.	- MOA	SL (20)			S
3) Agro-processing sub-sector remains relatively under-developed.	- Projects will be formulated to develop agro-processing for specific markets.	- HIAMP	HIAMP		IICA(18)	D/P
	- Micro-agro-processing sub-sector will be strengthened.	- MOA,OAS				D/P
4) Lack of adequate infrastructure for farmers organisations to take on domestic/export marketing.	- Formulation of projects to provide marketing infrastructure for selected second level farmers organisations.	- MOA,CUC, IICA,FAO		IICA/SL(21)		P/S

PRIORITY CONSTRAINTS	ACTIONS TO BE TAKEN	ASSISTING INSTITUTIONS	PRESENT STATUS	
			Under-way	In-pipe-Project Action profile needed
8. EXPORT MARKETING:				
1) Insufficient volumes of quality produce available at competitive prices.	- Projects will be formulated for the systematic production/marketing of each of those fruits designated as priority commodities.	- MOA, IICA, PAO, NIAMP.	PAO(6) IICA USAID	IICA(18) D/P
2) Large amounts of fresh fruits from the Windward Islands are sold in Barbados and T/T markets. Their import substitution programmes are likely to have a negative impact on Sub-region.	- Analysis of the changing situation in Barbados and T/T to evaluate potential impact on demand for fruits from the Sub-region.			IICA(2) D/P
3) The most serious constraint to export marketing is the lack of adequate transportation.	- Regional workshop to analyse the alternative models to overcome the transportation bottleneck to regional/extraregional markets.			D/P
	Evaluation of the Farm-to-Market intra-regional marketing experience.			T/\$
	* Improved coordination between CATCO and national exporters.	- CATCO		D/PU
	Formulation of transport project to resolve marketing bottleneck.	- NIAMP		D/P
4) Schooners used for intra-regional trade are not suited for carrying perishables.	Economic evaluation of shuttling produce between islands.			T/\$
	Case studies to determine technical and economic potential for adequate schooners for carrying perishable commodities with reduced losses.	- PAO	PAO(10)	PU

Abbreviations: D = decision; PU = followup; P = project formulation; S = study; T = terms of reference; \$ = financing.

* = Government decision required.

Actions in bold face type indicate their inclusion in Project Profiles.

Footnotes:

- (1) Profile 1: Integration and coordination of sub-regional projects and activities for the development of the fruit sub-sector in the Windward Islands.
- (2) Profile 2: Determining priority fruit crops and production areas in the Windward Islands.
- (3) A project profile has been prepared by IICA as part of its actions to strengthen information systems for small farmers.
- (4) Project design report prepared by CIDA: CARICOM Production and Market Information System.
- (5) In 1987 IICA created a unit in the Eastern Caribbean to provide technical assistance in project formulation.

continuation of Table F-6

- (6) A five week training course will be held at the U. of California, Davis to train 16-20 persons from the Eastern Caribbean in using a commodity systems approach to identify problems and design solutions. Outputs will include project profiles.
- (7) The Dominica Export Import Agency (DEXIA) was created in 1986 as an institution to provide facilitating services to actual and potential exporters. Technical assistance is being provided by TDRI/BDO.
- (8) Profile 6: Strengthening of farmers organisations in the Windward Islands.
- (9) The OAS has provided consultancies to the Huckster Association in Dominica to identify and formulate projects and to assist in training and other services.
- (10) The FAO is executing a two year programme titled: "Reduction of postharvest losses of fruit and vegetables entering inter-island trade" in the Eastern Caribbean. Actions include upgrading wharfs and schooners and training in postharvest handling of perishables.
- (11) USAID is improving physical infrastructure at three nurseries in St. Lucia.
- (12) Profile 3: Improving efficiency in fruit nurseries of the Windward Islands.
- (13) Profile 4: Fruit crop germplasm bank for the Eastern Caribbean.
- (14) Profile 5: Generation and transfer of technology for priority fruit production and marketing in the Windward Islands.
- (15) In 1987, FAO initiated a survey to determine the extent of infestation of the mango seed weevil in the Eastern Caribbean.
- (16) Surveys to determine the existence of fruit flies in St. Vincent and Grenada were initiated in 1986 as a joint effort between USDA, USAID, IICA and MOA.
- (17) Surveys to determine the existence of fruit flies in St. Lucia and Dominica are being planned for implementation in 1987.
- (18) Profile 8: Formulation of projects for the organised production and marketing of selected fruits in the Windward Islands.
- (19) CAPCO is providing technical assistance to exporters in an attempt to assure that packaging, weights and measures conform to demand.
- (20) A first document has been prepared by MOA/St. Lucia identifying priority crops for import substitution.
- (21) The IICA office in St. Lucia is assisting STAPCO-OP in the formulation of a project whereby this federation of farmers organisations will take over the facilities of the St. Lucian Marketing Board.

Table F-7: Summary of Required Actions to Develop the non Traditional Fruit Sub-sector, by Area

POLICY DECISIONS	MACRO-ENVIRONMENT AND ORGANISATIONAL STRUCTURE	PREPRODUCTION, PRODUCTION AND HARVESTING	POSTHARVEST HANDLING	DOMESTIC AND EXPORT MARKETING
1) To undertake the development of the fruit sub-sector in an organised fashion.	1) Determining priority fruits and production areas.	1) Improvement of efficiency of selected varieties.	1) Determine minimum needs for post-harvest infrastructure for specific products.	1) Formulation of national marketing strategies.
2) To concentrate resources in priority areas.	2) Diagnosis of information needs of small farmers.	2) Complan bank for the Eastern Caribbean.	2) Formulation of projects to provide farmers organisations with physical infrastructure.	2) Priorisation of targets for import substitution.
3) To clarify policies in the following areas impacting upon fruit production: - land use - information systems - plant propagation - farmers organisations - technology generation and transfer - credit - marketing - import substitution - coordination of projects and activities impacting upon fruit production & marketing.	3) Developing public sector information systems. 4) Train personnel in crop forecasting. 5) Train personnel in project formulation. 6) Strengthening of farmers organisations. 7) Formation of huckster associations in St. Lucia & Grenada. 8) Provide facilitating services through huckster associations 9) Restructuring & strengthening of marketing board services.	3) Train personnel in nursery management, planning & technical aspects. 4) Budwood registration & certification programme. 5) Improved museum plots. 6) Research on priority problems in commodity system. 7) Development of technological packages. 8) Training extensionists and farmers in use of tech-packs. 9) In-depth study of mango seed weevil. 10) Fruit fly surveys. 11) Identification of other pests of economic importance.	3) Generation and transfer of appropriate technology. 4) Establishment of common standards for Sub-regional fruits destined to extra-regional markets. 5) Specialised actions in following areas: - potential use of IBD by country. - wharf/port needs. - evaluation of needs for domestic transport. 6) Training of technicians, farmers & exporters in post-harvest handling of produce.	3) Analysis of demand for fruits from the tourist industry and supply potential. 4) Formulation of projects to develop agro-processing potential. 5) Strengthening of the micro-agro-processing sub-sector. 6) Formulate projects for organised production/marketing of fruits for export. 7) Regional workshop to analyze transportation constraints & solutions. 8) Specialised actions: - Evaluation of FTM experience. - Inter-island shuttling of fresh produce. - Upgrading of schooners. - Alternative roles for CAPCO support to exporters. 9) Formulate project to resolve transportation bottleneck.
4) Formation of Sub-regional committee to coordinate projects and activities conforming the Sub-regional strategy.	10) Organize associations of exporters. 11) Provide line of credit to exporters. 12) Analysis of stages of development leading to WINBAN of today	12) Surveys & inventories of breadfruit, mangoes & citrus for rehabilitation & top working.		

* Action areas in bold face type indicate those areas where governments and/or public sector institutions must make decisions! Project ideas in solid line boxes are included as project profiles; those in dotted line boxes are sub-components of the projects.

2. PROPOSED ACTIONS

2.1 Proposed Actions at the Sub-Regional Level

Given the goal of developing the potential for joint marketing of non-traditional fruits from the Sub-region, it is necessary to identify common constraints shared by the four islands as well as the favourable or negative aspects that affect only one or a few of the states. Table F-8 summarizes the favourable and unfavourable conditions in respect to markets, production, postharvest and services for tree crops, by country. An analysis of this table will provide the general justification for institutional strengthening projects of a horizontal nature which will benefit equally each of the four countries making up the Sub-region.

In respect to markets, an attempt is made to identify the most favourable (+) existing markets and those where unfavourable (-) conditions presently exist. In the latter case, in some instances, the constraints may be overcome through developmental actions.

On the domestic scene the greatest immediate growth potential seems to lie in agro-processing in Dominica and tourism in the other three islands. Increases in volumes of produce sold through public and supermarkets are not expected to be great due to a high percent of rural populations and relatively low increases in total populations.

Dominica has comparative advantage in intra-regional marketing due to geographical location (northernmost of the Windwards and between two French Islands), strong huckster organization, access to refrigerated ship (FTM) and strong governmental support in the promotion of exports. Of the remaining three islands, in respect to intra-regional marketing, Grenada has favourable conditions for marketing in Trinidad only, St. Lucia in Barbados only and St. Vincent in Trinidad, and to a lesser degree in Barbados.

In respect to extra-regional markets, the UK and Canada represent the most favourable markets for all four countries as a result of established historical and ethnic links and available transportation. Other EEC countries, e.g. Holland, offer potential markets for selected items from the two countries having international airports (Grenada and St. Lucia). The USA represents a potential market for selected commodities for which quarantine barriers are not a problem, thus both Grenada and St. Vincent will have a distinct advantage when fruit fly free status is obtained. In the case of mangoes this advantage will disappear should the mango seed weevil appear on the scene. Regional specialists are of the opinion that the probability of this happening are quite high.

On the production side, although all four islands have favourable ecological conditions, cultural and management practices are less than required to produce a continuous supply of exportable quality produce. Pests are a serious constraint in Dominica and St. Lucia for the export of mangoes and perhaps other fruits (the status of fruit fly in these two islands is presently unknown).

Table F-8: Favourable and Unfavourable Conditions in the Areas of Markets, Production, Postharvest and Services for Tree Crops in the Windward Islands (1)

Areas	Dominica	Grenada	St. Lucia	St. Vincent
MARKETS: (2)				
1) Domestic:				
- Public markets/supermarkets	-	+	+	+
- Tourist industry	-	+	+	+
- Agro-processing industry	+	-	-	-
2) Regional:				
- Barbados	+	-	+	+
- Trinidad/Tobago	-	+	-	+
- Leeward Islands	+	-	-	-
- Other Windward Islands	+	-	-	-
- French Islands	+	-	-	-
- Virgin Islands	+	-	-	-
3) Extra-regional:				
- UK	+	+	+	+
- Other EEC	-	+	+	-
- USA	-	+	+	-
- Canada	+	+	+	+
PRODUCTION:				
1) Ecological conditions	+	+	+	+
2) Cultural practices	-	-	-	-
3) Pests and diseases (3)	-	+		+
POSTHARVEST:				
1) Roads	+	+	+	+
2) Seaports	+	+	+	+
3) Airports	-	+	+	-
4) Assembly/packing/grading	-			
SERVICES:				
1) Transportation services	-			-
2) Market information		-	-	-
3) Generation/transfer of tree crop technology	-			-
4) Propagation and distribution of planting materials	-			-
5) Strengthening farmers organizations in management and marketing	-			-
6) Plant protection and quarantine service	-			-
7) Integration and coordination of Sub-regional fruit sub-sector development programme	-			-

(1) Ratings: (+) indicates more favourable conditions while (-) indicates unfavourable or need for improvement.

(2) Based on available market studies, actual export statistics and interviews with exporters. Additional market research may be required.

(3) Pest or disease of quarantine significance, i.e. mango seed weevil.

2.2.3. St. Lucia

2.2.3.1 Markets

St. Lucia has the largest population of the four Windward Islands, the highest percentage of people residing in the capital city (38%) and the largest number of tourists and tourist facilities. Visits of cruise ships in 1987 are expected to reach 230. Therefore, the sales of fruit in public markets, supermarkets and hotels and restaurants can be expected to tend upwards. The consumption of fresh fruits through the tourist industry offers the greatest growth potential on the domestic market (Table F-11). Sales of fruit to local agro-processing businesses is low since nearly all the installed capacity consists of small home and cottage industries which process very small amounts of a wide variety of fruits. Annual value of imported fruit juices, mainly citrus, is on the order of EC\$2.5 million which may justify a local juice processing industry.

The principal regional market for St. Lucia has traditionally been Barbados. With the closure of that market to St. Lucian mangoes, due to the mango seed weevil, exports have declined and presently consist of bananas, plantain, grapefruit and oranges transported by the hucksters. Some potential exists in the Virgin and Leeward Islands for St. Lucian fruits, however, due to transportation constraints plantain is about the only fruit being shipped to those markets.

Unlike the other islands of the Sub-region over 75% of St. Lucian exports are sold in extra-regional markets, primarily the UK and to a much lesser degree Canada. Small amounts of mango, avocado and breadfruit are beginning to penetrate the Holland market. Mango is not allowed into the USA because of the seed weevil. Avocado and citrus cannot compete with California and Florida production nor can St. Lucian plantain compete with production from the Dominican Republic. Thus the only product, of those analyzed, that may have comparative advantage in the USA market seems to be breadfruit.

In terms of competitiveness there exist relatively large supplies of mango, avocado, grapefruit, breadfruit and plantain in St. Lucia, however, when it comes to large supplies of quality produce only breadfruit and plantain qualify.

Like the other islands of the Sub-region, production costs are felt to be competitive and inputs can be obtained through farmers organizations. Labour costs are similar to those in the other Windward Islands.

St. Lucia has access to more shipping companies and more air lines bound to extra-regional markets than any of the other islands. However, transportation remains a serious constraint. While the inter-island schooners tend to satisfy the huckster trade, although with less than desirable conditions, air space to the UK and Canada are insufficient to meet demand and produce with a market is frequently left behind. Excess cargo capacity exists for the USA market, both by sea and by air, mainly because of the low levels of exports of fresh produce to this market.

Table P-9: Identification of Favourable and Unfavourable Conditions in the Areas of Marketing, Production and Postharvest Handling of Selected Tree Crops, Dominica (1)

Areas	Mango	Avocado	Grapefruit	Orange	Lime	Breadfruit	Papaya	Plantain
MARKETS: (2)								
1) Domestic:								
- Public markets and/or supermarkets	-	-	-	-	-	-	-	-
- Tourist industry	-	-	-	-	-	-	-	-
- Agro-processing industry (3)	-	-	+	+	+	-	+	-
2) Regional:								
- Barbados	-	+	+	+	+	-	-	+
- Trinidad/Tobago	-	-	-	-	-	-	-	+
- Leeward Islands	-	+	+	+	+	-	+	+
- Other Windward Islands	-	-	+	-	+	-	-	-
- French Islands	-	+	+	+	+	+	+	-
- Virgin Islands	-	+	+	+	+	+	+	+
3) Extra-regional:								
- UK	+	+	+	-	+	-	-	+
- Other EEC	-	-	-	-	-	-	-	-
- USA	-	-	-	-	-	-	-	-
- Canada	+	-	+	-	-	-	-	-
4) Product competitiveness:								
- Sufficient quantity	+	+	+	+	-	+	-	+
- Sufficient quality	-	+	+	-	+	-	-	+
- Costs of production (4)	+	+	+	+	+	+	+	+
5) Transportation to:								
- Regional markets	+	+	+	+	+	-	-	+
- UK market	-	-	+	-	+	-	-	+
- Other EEC countries	-	-	-	-	-	-	-	-
- USA	-	-	-	-	-	-	-	-
- Canada	-	-	-	-	-	-	-	-
PRODUCTION:								
1) Ecological conditions:								
- Temperature/humidity	+	+	+	+	+	+	+	+
- Wind (5)	+	+	+	+	+	+	+	+
- Soil conditions	+	+	+	+	+	+	+	+
- Water (6)	+	+	+	+	+	+	+	+
2) Growing areas:								
- Orchard stands	-	-	+	-	+	-	-	+
- Concentration of trees in certain agricultural districts	+	+	+	+	+	+	-	+
3) Availability of best cultivars								
4) Cultural practices/management								
5) Pests and diseases of:								
- Quarantine significance	-	+	UN	UN	+	+	UN	+
- Economic significance	-	-	-	-	-	+	-	+
6) Harvest								

Continuation of Table F-11

Areas	Mango	Avocado	Grapefruit	Orange	Lime	Breadfruit	Papaya	Plantain
POSTHARVEST HANDLING:								
1) Assembly	-	-	-	-	-	-	-	+
2) Postharvest treatments (7)	-	+	+	+	+	-	-	+
3) Grading/Packaging	-	-	-	-	-	-	-	+
4) Domestic transport	+	+	+	+	+	+	+	+
5) Cooling (8)	-	-	+	+	+	-	-	+
6) Storage (9)	-	-	-	-	-	+	-	+

- (1) Ratings: (+) = favourable or existent; (-) = unfavourable or need for improvement; un = unknown.
- (2) Based on available market studies, actual export statistics and interviews with exporters. Additional market research will be required.
- (3) A (+) indicates the existence of commercial processing capabilities for the respective commodities.
- (4) Compared to production costs in Barbados, Trinidad/Tobago, Florida and the other Windward Islands.
- (5) Under normal conditions wind is not a detriment for most crops except in specific exposed areas. Tree crops such as plantains, papaya and avocados are relatively more susceptible to wind damage.
- (6) All crops may be produced under rainfed conditions, however, supplementary water (irrigation) during dry seasons and in particularly dry areas, will increase yields and fruit quality.
- (7) A (-) indicates that postharvest treatments are necessary and are presently inadequate.
- (8) Cooling facilities for fruit in St. Lucia are generally unavailable, thus a (+) indicates that cooling is not necessarily required.
- (9) Most fruit crops are not stored for any length of time thus a (+) indicates that storage is either available or not required. In the case of a negative sign (-), this indicates that adequate storage is unavailable. Adequate storage in these cases may mean cool storage.

On the intra-regional market Dominica is quite active, marketing produce through the huckster trade in most of the islands but with the largest volumes going to the French Islands. In the case of Trinidad only plantains are marketed and these on a barter basis for Trinidadian flour. Small amounts of citrus are sold to St. Lucia for the tourist industry towards the end of the citrus season in that country. A strong huckster organization, nearness to markets, strong governmental support and availability of a refrigerated vessel are distinct advantages that warrant further development of this type of trade.

In respect to extra-regional markets the UK remains the best alternative with some prospects for mango and grapefruit in Canada. The principal bottleneck for marketing all fresh commodities is that of transportation. Without an international airport transportation is limited to the inter-island schooners, the Farm To Market refrigerated vessel, for inter-island trade, and the Geest ships used mainly for hauling bananas to the UK. The fact that Dominica is the last stop for the Geest ships gives this island certain advantages in that the short shelflife of fruits becomes less of a constraint. Space availability, however, remains a constraint. Transportation to other extra-regional markets is either not available at all or can only be carried out under considerable risk.

As to the felt competitiveness of Dominican produce on the regional and extra-regional markets, six of the eight commodities studied seem to be produced in sufficient quantities to warrant the development of specific markets at this time. Only Tahiti lime and papaya are produced in insufficient quantities. In terms of quality of the production, all of the commodities warrant some improvement. Some avocado, grapefruit, limes, breadfruit and plantain are being produced with a high enough quality to meet the demands of specific markets. In some cases, e.g. avocado, breadfruit and plantain, the markets are ethnic ones. Production costs in Dominica are on a par with those in the rest of the Windward Islands and while being less than those in Barbados, Trinidad and Florida are higher than the costs of production in Haiti, the Dominican Republic and some other Central American countries. Production costs in general do not appear to be a major constraint except maybe in the case of citrus, particularly grapefruit and oranges. Grapefruit, due to high prices, can only be marketed in the UK during a six week window when major competitors are out of the market.

2.2.1.2 Production

Dominica has excellent ecological conditions for growing a wide variety of tropical fruits. Temperature, humidity and soil conditions are favourable and wind and water are constraints only in specific areas and under abnormal weather conditions. While trees of a particular species may be concentrated in certain agricultural districts, only in the case of grapefruit, limes and plantain can it be said that there are orchard stands. Under the Tree Crop Diversification Project efforts were made to concentrate the production of avocados and mangoes as well. The scattered nature of the tree crops adds to production costs, makes cultural practices

2.2.3.4 Project ideas for St. Lucia

While projects to overcome constraints as a result of inefficient or weak services can best be executed on a multi-national basis, projects to resolve specific production/marketing related problems must be country and often commodity specific. This type of project can best be formulated by interdisciplinary teams of specialists. Some project ideas which might be developed into feasible development projects for St. Lucia follow:

- 1) Development of production and processing capability for orange and grapefruit juice industry.
- 2) Top working of mangoes with suitable cultivars for the UK and Canadian markets.
- 3) Rehabilitation of breadfruit trees for UK and USA market.
- 4) Introduction of avocado cultivars to extend the production season.
- 5) Development of papaya production/marketing capacity of members of associations of small farmers.
- 6) Development of carambola production and marketing capacity.
- 7) Development of domestic and/or export marketing capacity of STAFCCO-OP for perishable produce.
- 8) Formation and strengthening of exporters association.
- 9) Development of packing house facilities for use by members of exporters association.
- 10) Construction and operation of cool storage space at Hewanorra Airport.
- 11) Development of a second SFAD assembly centre for farmers organizations in the South of the Island.
- 12) Development of intra-island two way trade through improved inter-island shipping.

2.2.4 St. Vincent

2.2.4.1 Markets

The population of St. Vincent lies midway between that of St. Lucia and Grenada and is predominantly rural. Tourism is at about the same level as that in Grenada and growing. One small commercial size industry began processing citrus for juices in 1986. In summary, there are some favourable conditions for increased domestic consumption of fruits (Table F-12) but the local market is not likely to absorb any large increases in production.

Like Grenada most fruits, as well as other fresh produce, are transported by the inter-island schooners, and a few larger metal ships, and sold in Trinidad. The Trinidad market may begin to level out as local self sufficiency increases, however, this is likely to remain as the most favourable market for the foreseeable future. Small volumes of mangoes, citrus and plantain are also sold in the Barbados market. Other regional markets are made difficult by the transportation constraint.

St. Vincent can only ship by air to extra-regional markets by transshipment through either St. Lucia or Barbados. Presently, mangoes and breadfruit are shipped to the UK in this manner as are mangoes, avocados, breadfruit, plantain and golden apples to Canada. Markets in other EEC countries are unfeasible at this time due to the transportation constraint and the USA market appears unfavourable due to quarantine restrictions and lack of direct transportation. Breadfruit may be an exception although transshipment through St. Lucia or Barbados is always a problem, exacerbated by its short shelf life.

St. Vincent does generate relatively large volumes of mangoes, avocados, breadfruit, plantain and golden and sugar apples. Quality of produce is only up to international standards in the cases of plantain and some breadfruit. As in the other Windward Islands it is felt that production costs are within limits which will permit competition on international markets. Most inputs are only available through farmers organizations. Farm labour is reported to be more productive than in Grenada and St. Lucia and on a par with that in Dominica.

Although St. Vincent may soon be declared free of the fruit fly, thus given a comparative advantage for shipping to the USA market, it will continue to be at risk of eventually being infested with the mango seed weevil, already identified in neighbouring St. Lucia, which would effectively close the door to the USA market for mangoes.

2.2.2.2 Production

St. Vincent has at least as good, ecological conditions for growing fruit trees as the other countries of the Sub-region. Like Grenada, it has a lower risk of hurricane winds than Dominica and St. Lucia.

As in St. Lucia and Grenada it has no orchard stands of fruit trees other than the traditional bananas and plantain. Like the other

Table F-12: Identification of Favourable and Unfavourable Conditions in the Areas of Marketing, Production and Postharvest Handling of Selected Tree Crops, St. Vincent (1)

Areas	Mango	Avocado	Grapefruit	Orange	Lime	Breadfruit	Papaya	Plantain
MARKETS: (2)								
1) Domestic:								
- Public markets and/or supermarkets	+	+	+	+	+	+	+	+
- Tourist industry	+	+	+	+	+	+	+	+
- Agro-processing industry (3)	-	-	+	+	+	-	-	-
2) Regional:								
- Barbados	+	-	+	+	-	-	-	+
- Trinidad/Tobago	+	+	+	+	+	-	-	+
- Leeward Islands	-	-	-	-	-	-	-	+
- Other Windward Islands	-	-	-	-	-	-	-	-
- French Islands	-	-	-	-	-	-	-	-
- Virgin Islands	-	-	-	-	-	-	-	+
3) Extra-regional:								
- UK	+	-	-	-	-	+	-	-
- Other EEC	-	-	-	-	-	-	-	-
- USA	-	-	-	-	-	+	-	-
- Canada	+	+	-	-	-	+	-	+
4) Product competitiveness:								
- Sufficient quantity	+	+	-	-	-	+	-	+
- Sufficient quality	-	-	-	-	-	-	-	+
- Production costs (4)	+	+	+	+	+	+	+	+
5) Transportation to:								
- Regional markets	+	+	+	+	+	-	-	+
- UK market	-	-	-	-	-	-	-	-
- Other EEC countries	-	-	-	-	-	-	-	-
- USA	-	-	-	-	-	-	-	-
- Canada	-	-	-	-	-	-	-	-
PRODUCTION:								
1) Ecological conditions:								
- Temperature/humidity	+	+	+	+	+	+	+	+
- Wind (5)	+	+	+	+	+	+	+	+
- Soil conditions	+	+	+	+	+	+	+	+
- Water (6)	+	+	+	+	+	+	+	+
2) Growing areas:								
- Orchard stands	-	-	-	-	-	-	-	+
- Concentrations of trees in certain agriculture districts	+	+	+	+	+	+	-	+
3) Availability of best cultivars								
-	-	-	-	+	-	+	-	+
4) Cultural practices/management								
-	-	-	-	-	-	-	-	+
5) Pests and diseases:								
- Quarantine significance	+	+	+	+	+	+	+	+
- Economic significance	-	-	-	-	-	+	-	+
6) Harvest								
-	-	-	-	-	-	-	-	+

Continuation of Table F-19

Areas	Mango	Avocado	Grapefruit	Orange	Lime	Breadfruit	Papaya	Plantain
POSTHARVEST HANDLING:								
1) Assembly	-	-	-	-	-	-	-	+
2) Postharvest treatments (7)	-	+	+	+	+	-	-	+
3) Grading/Packaging	-	-	-	-	-	-	-	+
4) Domestic transport	+	+	+	+	+	+	+	+
5) Cooling (8)	-	-	+	+	+	-	-	+
6) Storage (9)	-	-	-	-	-	+	-	+

- (1) Ratings: (+) = favourable or existent; (-) = unfavourable or need for improvement; un = unknown.
- (2) Based on available market studies and actual export statistics. Additional market research will be required.
- (3) A (+) indicates the existence of commercial processing capabilities for the respective commodities.
- (4) Compared to production costs in Barbados, Trinidad/Tobago, Florida and the other Windward Islands.
- (5) Under normal conditions wind is not a detriment for most crops except in specific exposed areas. Tree crops such as plantains, papaya and avocados are relatively more susceptible to wind damage.
- (6) All crops may be produced under rainfed conditions, however, supplementary water (irrigation) during dry seasons and in particularly dry areas, will increase yields and fruit quality.
- (7) A (-) indicates that postharvest treatments are necessary and are presently inadequate.
- (8) Cooling facilities for fruit in Grenada are generally unavailable, thus a (+) indicates that cooling is not necessarily required.
- (9) Most fruit crops are not stored for any length of time thus a (+) indicates that storage is either available or not required. In the case of a negative sign (-), this indicates that adequate storage is unavailable. Adequate storage in these cases may mean cool storage.

islands fruit species tend to be concentrated in certain agricultural districts although the trees are scattered within and between farms.

Relatively good cultivars are available for many of the fruits listed in Table F-12 but there is room for improvement in the case of mangoes, avocados, grapefruit, lime and papaya.

Tree crop cultural and management practices are deficient as a result of uncertain market conditions. This results in the production of fruit below international standards in terms of quality.

Pests and diseases of quarantine significance for the USA market have not been identified.

Harvest techniques used are intended to minimize costs. This results in damage to fruit during the harvest phase and thus postharvest quality is diminished.

2.2.4.3 Postharvest

Assembly is made difficult and expensive by the scattered nature of plantings. Domestic transportation can be improved upon, however, this is not felt to be a major constraint.

Postharvest treatment requirements are minimal in the case of avocados and citrus. Improvements will be required in postharvest treatments of mangoes, breadfruit, papaya and some other exotics. However, these improvements can only be introduced as the transportation constraints are overcome.

In general, grading and packaging are presently carried out in a very rudimentary fashion, with a minimum of investment in equipment and facilities. This is not necessarily a negative practice for the existing situation but improvements will have to be made if the desire is to handle larger volumes of produce for more sophisticated markets.

Cooling and storage will have to be considered in terms of the commodity, the volume to be handled and the intended market. Economies of scale may or may not justify cooling and with some commodities cooling and storage may not be necessary. Cooling is most likely to be a requirement in the cases of mangoes, avocados, breadfruit and papaya.

2.2.4.4 Project ideas for St. Vincent

The solution of specific problems affecting the production and marketing of fruits in St. Vincent will require the identification, formulation and execution of feasible development projects. These projects can be prepared and executed by interdisciplinary teams of specialists. Some project ideas are the following:

- 1) Top working of mangoes with suitable cultivars for the USA market.
- 2) Development of papaya production/marketing capacity within selected organizations of small farmers.

- Development of carambola production and marketing capacity within one of the Government owned estates
- 4) Rehabilitation of breadfruit trees to facilitate harvesting.
- 5) Development of improved cultural/management practices for the production of golden apple.
- 6) Development of model fruit farm for small farmers
- 7) Development of domestic and/or external marketing capacity of the Organisation for Rural Development (ORD)
- 8) Design and operation of effective temporary storage facilities for the huckster/trafficker trade.
- 9) Development and operation of packing house facilities for use by multiply exporters.
- 10) Development of air or sea shuttle service for fresh produce to Vieux Fort, St. Lucia.

2.3 Project Profiles

As was pointed out at the beginning of Part III, joint marketing between the Windward Islands is presently not feasible for any one commodity and would be even more difficult to undertake for a group of commodities, e.g. non-traditional tree fruits. However, joint marketing should remain as a medium to long-term goal. The project profiles and ideas, which follow, are intended to develop capacities at the national levels which will eventually permit joint marketing to be implemented within the Sub-region for crops other than bananas.

Project Profiles having a Sub-regional Impact

In the identification of projects the criteria used was that they should represent a set of activities within a given time-frame for their implementation and should produce specific outputs

The titles of six project profiles proposed to be executed on a Sub-regional basis are presented in Table F-13 along with their respective timeframes of duration. Profiles were not prepared for the three problem areas of information, transportation and plant protection and quarantine, for the following reasons. In the first instance, CARICOM and CIDA have prepared a regional project to improve the information system. This proposal is now undergoing evaluation. In the second case, the HIAMP project is presently analyzing diverse alternatives for overcoming the transportation constraint. Since this subject area is very complex and the solution is likely to be of high risk, a more detailed analysis is required than can be presented here. The IICA is presently designing a multi-national plant protection project for the Windward Islands. Their efforts, combined with those of the FAO, should serve as orientation for overcoming the plant protection and plant quarantine constraint

Four of the six projects cover a time span from between 2 and 5 years while projects 1 and 4 will have a duration of ten years or longer. The purpose of Project 1 is to create the co-ordinating body for overseeing the development of the Sub-regional development strategy and eventually joint marketing activities. Although it will be financed over a five year period, the function itself will become a

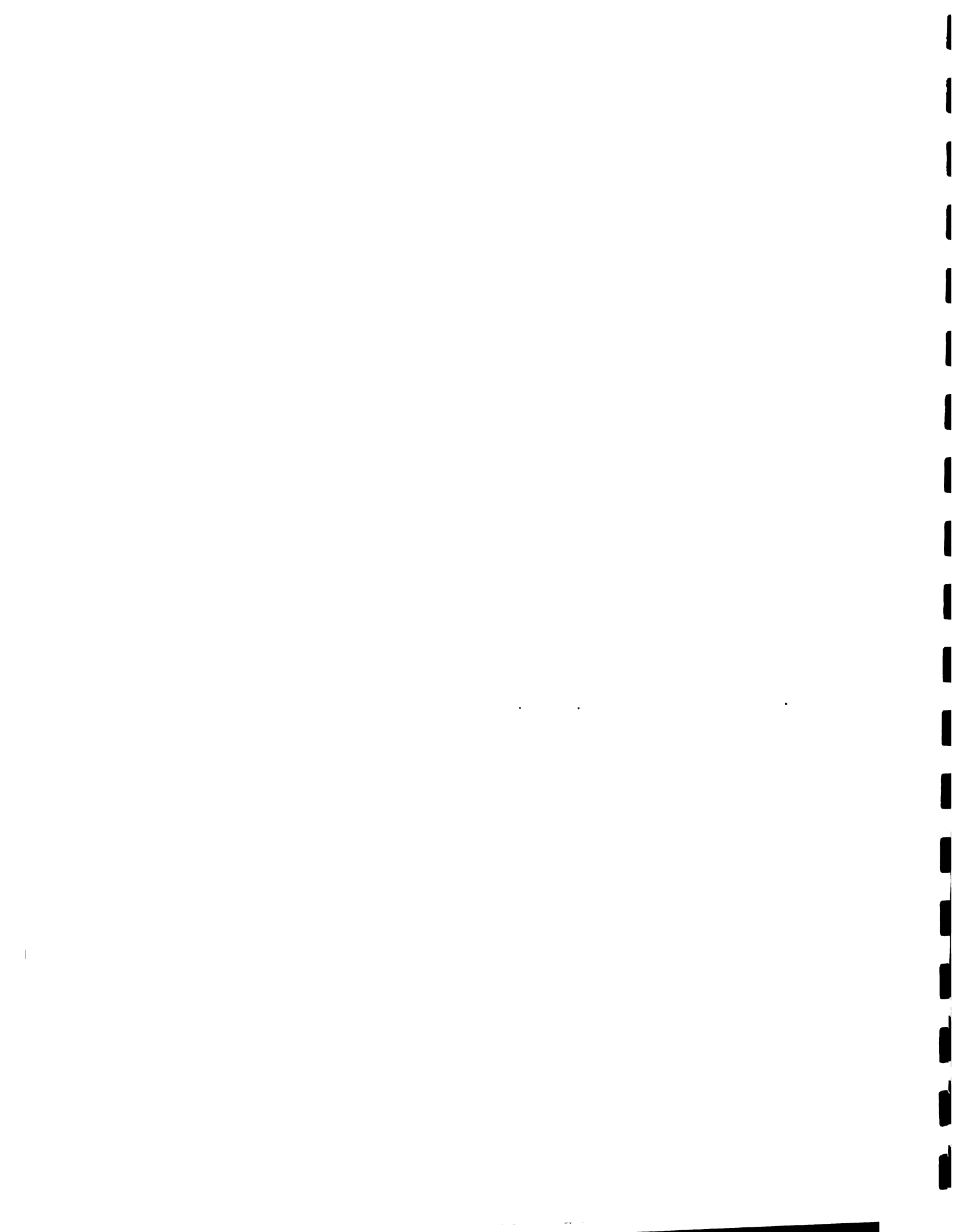


Table F-13: Title of Project Profiles and Duration of Implementation Period

PROJECT PROFILE		YEARS OF DURATION										
Number	Title	0	1	2	3	4	5	6	7	8	9	10
1	Integration and coordination of sub-regional projects and activities for the development of the fruit sub-sector in the Windward Islands	xxxx									iii	iiii
2	Determining priority fruit crops and production areas in the Windward Islands	xxxx										
3	Improving efficiency in fruit nurseries of the Windward Islands	xxxx										
4	Fruit crop germplasm bank for the Eastern Caribbean	xxxx										ssss
5	Generation and transfer of technology for priority fruit production and marketing in the Windward Islands	xxxx										
6	Strengthening of farmers organisations in the Windward Islands	xxxx										
7	Actions for the organised production and marketing of selected fruits in Dominica, Grenada, St. Lucia and St. Vincent	xxxx										

Notes: xxx = period over which project is financed.
 iii = project becomes institutionalised.
 sss = project becomes self-financing.

permanent activity. The germplasm bank (Project 4) will also become a permanent service and should be self-financing by the eighth year of operation.

Five of the projects (numbers 1, 3, 4, 5 and 6) contain elements of institution building: project 1 will create a permanent coordinating mechanism; project 3 will improve the efficiency of government nurseries; project 4 institutionalizes a regional germplasm bank; project 5 strengthens the MOA capacity to generate and transfer technology on fruit production and postharvest handling while project 6 strengthens organizations of small farmers.

~~Project~~ 2 will generate information required for decision making, particularly for the prioritization of fruits and production areas within each country.

Of the six projects, numbers 1, 3, 5 and 6 will have an immediate impact (1 to 3 years) on the fruit sub-sector. The impact of the remaining projects (2, and 4) will be felt to a greater degree over the medium and long term (3 to 10 years).

2.3.2 Project Profiles Concentrating on National Priorities

The formulation of projects requires an institutional structure to coordinate the actions of an interdisciplinary team whose members will vary with the nature of the project. During the formulation stage operational costs are incurred and sometimes outside consultants in specialized areas are required. All of the above involves costs which are normally unavailable within national institutions.

In the preceding section a wide variety of project ideas have been identified. Although not all of these will be developed into projects, some will require resources for the formulation effort. To generate these resources Project Profile 7 (Table F-13) has been prepared. Within this proposal examples of profiles oriented to resolve specific country constraints have been included.

PROFILE 1

INTEGRATION AND COORDINATION OF SUB-REGIONAL PROJECTS AND ACTIVITIES FOR THE DEVELOPMENT OF THE FRUIT SUB-SECTOR IN THE WINDWARD ISLANDS

1. **COVERAGE:** Dominica, Grenada, St. Lucia and St. Vincent
2. **DESCRIPTION OF THE PROBLEM**

More than 50 regional and international institutions and donor agencies are actively assisting national governments in diverse development activities and projects in the Windward Islands. Approximately 20 of these are supporting projects which impact directly or indirectly upon diverse aspects of fruit production (Table A-9). These organisations have and continue to contribute large amounts of financial and technical assistance to both private and public sector institutions. Since objectives and strategies vary with the respective governments and institutions the impact of these considerable resources is not as great as it would be if they were better coordinated and oriented towards a common goal.

International organisations and funding agencies often have preconceived ideas about the principal constraints and the best methods for overcoming them. This often leads to the execution of development activities oriented towards the removal of specific constraints while overlooking conditioning factors outside the scope of the project itself. When the project does not reach its intended goals the organisations return to the drawing boards to design another partial solution. In some instances the well designed projects fail simple because they were executed at the wrong point in time, i.e. before other higher priority components were in place, or for failure to consider the marketing aspect.

Due to the wide variety of organisations interested in developing the fruit sector and to relatively poor coordination between them, there is considerable overlapping and failure to achieve economies of scale in carrying out many activities which could best be done on a Sub-regional basis, e.g. market studies, tree crop research, training, etc. The end result is a relatively inefficient use of scarce resources and achievement of less than the desired impact.

With each organisation developing projects, activities, studies, etc. in their respective areas of interest, considerable pressure is placed on national counterparts whose valuable time is often spent on receiving technical missions of regional and international personnel. Relatively little time is allocated by the nationals in planning and integration of the diverse activities and projects.

3. OBJECTIVES

General:

To contribute to export development and import substitution through agricultural diversification with fruits.

Specific:

To achieve an effective integration of all activities and projects executed by national, regional, and international organisations leading to the development of the fruit sub-sector in the Windward Islands.

4. EXPECTED OUTPUTS

- 1) Definition of priority constraints, projects and activities and the development of a Sub-regional production and marketing strategy for the fruit sub-sector.
- 2) Improved coordination between national, regional, international and donor organisations.
- 3) More effective utilisation of available resources.

5. DESCRIPTION OF THE PROJECT

The first step in undertaking this project will be the identification of one person from the MOA in each of the Windward Islands to form the coordinating committee for the development of the fruit sub-sector. This committee will be responsible for the overall supervision and integration of all the fruit sub-sector development activities within the Sub-region.

A team of consultants, or representatives from national, regional and international organisations, will be formed to carry out an institutional analysis aimed at the identification of existing and potential human and economic resources which may contribute to the development of the fruit sub-sector. Areas to be covered in this study will include the identification of the distinct institutions, their present activities and existing and potential human and economic resources and their work preference areas.

The principal constraints for the production and marketing of fruit have been identified in the study "Proposed Strategy for the Development of the Fruit Sub-Sector in the Windward Islands" and other available literature. These will have to be reviewed and updated, where necessary. Based on the results of this analysis and the available and potential resources, as well as the analysis of on-going activities, the coordination committee will validate the priority problem areas and define institutional responsibilities for developing the fruit sub-sector.

In those priority areas not receiving attention, the Committee will take the responsibility for the identification of human and financial resources best indicated to formulate and/or develop the new project ideas.

The Committee will make recommendations on the need for training in specific areas and in the identification of resources for its realisation

The Committee will have the responsibility for the monitoring and the evaluation of each project making up the fruit sub-sector development programme and recommending modifications where pertinent

6. IMPLEMENTATION PLAN (five years)

Key Activities	From Month	To Month
Formation of Committee	1	1
Analysis of institutional resources	2	4
Review of literature and updating of problem areas	2	4
Validation of problem areas	4	4
Designation of respective institutional responsibilities	5	7
New project formulation	5	end of project
Supervision, monitoring, evaluation	1	end of project

For financing purposes the project will have a duration of five years, however, in practice the Committee should be established on a permanent basis.

7. PROJECT COSTS

Activity	Total Cost
Studies	US\$ 50,000
Project formulation	100,000
Operational costs	150,000
Miscellaneous	30,000
Total Costs	US\$330,000

PROFILE 2

DETERMINING PRIORITY FRUIT CROPS AND PRODUCTION AREAS IN THE WINDWARD ISLANDS

1. **COVERAGE:** Dominica, Grenada, St. Lucia and St. Vincent
2. **DESCRIPTION OF PROBLEM:**

Arable land is very limited in each of the Windward Islands and irrigated, arable land is even more scarce and normally utilized for the production of traditional export crops, mainly bananas. Although only a few miles in width, each of the Islands is criss-crossed by rugged mountain ridges with high points ranging from 840 m in Grenada to 1,447 m in Dominica. Of the total land area (2,099 sq. km) of the four Islands, 40 percent has a slope of over 30 %. Mean temperatures range from 20 to 31 degrees Celsius, rainfall ranges between 1000 mm to 7500 mm and there are wide variations in elevation. Although the Windward Islands can be said to have a very wide range of microclimates, favourable for growing a great variety of tropical fruits, insufficient information is available to make proper decisions as to the best locations for particular crop cultivars. For example, sweet orange requires cooler temperature than grapefruit or limes. Within the species of sweet orange, Valencia has a wider range of adaptation than W. Navel. The latter, when cultivated in warm low lands, produces large, dry fruit (non-marketable) while Valencia, under the same conditions, will produce good quality fruit.

A wide range of fruit crops (species and cultivars) have been introduced or are growing wild throughout the islands. Most of these have been introduced into the diverse countries in an ad hoc manner and location of the crops has been done on an empirical basis. The ecological requirements and economic feasibility of location are seldom given the attention they merit, resulting in a very wide geographical distribution of plants and a broad range of fruit quality. In order to compete on international markets, fruit of the highest quality must be produced. However, this can only be realized if good cultivars are planted in those areas having the most favourable ecological conditions for the fruit in question.

Existing literature, market studies and marketing specialists indicate the existence of a significant, and in some cases growing, market for many of the tropical fruits which the Windward Islands can grow with comparative advantage. However, most market studies are of a macro nature, providing information on total volume and value demanded, seasonality, principal producing countries, information available from secondary sources and long lists of importers, etc.. These studies seldom include comparative analysis of the advantages and disadvantages of the producing countries, in terms of costs of production, transportation and other factors which would permit decision makers to select the commodities that should be included in their respective development plans. Nor do these studies provide the necessary information concerning "market windows", ethnic markets, other speciality markets and markets for processed fruits, where the Windward Island are most likely to be able to compete favourably.

Each of the Island States operates under strict budgetary constraints. This makes it imperative that the limited resources for agriculture are utilised in an optimum manner so as to avoid unnecessary costs, e.g. repetitive market studies for each Island, increased use of chemicals to control pests and diseases brought on by improper location of fruit trees. Consequently, the best locations, in both ecological and economic terms, must be selected for each species.

3. OBJECTIVES

General:

To contribute to export development and import substitution through agricultural diversification with fruits.

Specific:

To identify, prioritize and set targets for specific fruit crop development schemes, by geographical areas within each country.

4. EXPECTED OUTPUTS

- 1) Existing and potential markets for selected non-traditional fruit crops identified and analysed and the comparative advantages of the Windward Islands in producing for those markets determined.
- 2) Actual production of selected fruit crops determined by country, and regions within countries.
- 3) Areas best suited for the concentration of specific fruit crops, considering transportation and marketing costs, identified and prioritised.
- 4) Production targets determined for each fruit.
- 5) Existing and required infrastructure and facilitating services to implement the zoning of tree crops in each of the four Windward Islands defined.

5. DESCRIPTION OF THE PROJECT

The following four studies will be carried out:

- National, regional and extra-regional marketing studies.
- Surveys of existing crop production by commodity.
- Ecological study to determine best suited growing areas.
- Institutional analysis of existing and required infrastructure and facilitating services.

These studies will generate the baseline information necessary to answer the following questions:

- What crops to produce and in what quantities?
- Where to plant them? and
- Infrastructure and service requirements for the producing areas?

Since effective zoning will be crop specific, the market studies and the crop production surveys must precede the ecological studies so as to predetermine the type of tree crop to be planted and the acreage of each.

A brief justification and description of each of the studies follows.

5.1 Regional and Extraregional Marketing Studies

Proximity to Trinidad, Barbados, Martinique, Virgin Islands or other territory may give a particular Windward Island comparative advantage over another on the regional market and production characteristics or access to an international airport may do the same on the extra-regional market. Competition has stimulated each of the Islands to act individually, each generating their own, although partial, marketing studies. Although all tend to conclude that markets do exist in the UK, Europe, USA and Canada, very little analysis has been made of the comparative advantages of the distinct suppliers nor of the different markets.

As part of a sub-regional marketing study, one or more consultants will be given the task of analyzing the national regional and extra-regional markets for the following crops: mango, avocado, orange, grapefruit, lime, paw paw, breadfruit, soursop, sapodilla, passion fruit, golden apple and carambola. The basic information to be generated will include:

- Existing and potential markets for each of the selected crops, including ethnic markets, for both fresh and processed fruits.
- Magnitude of market, market windows and required standards.
- Competitors or other suppliers of similar produce.
- Estimates of volumes of each product that the most favourable markets for the Windward Islands can absorb over the next ten years.
- Comparative advantages and disadvantages of the Windward Islands in terms of costs and marketing capabilities.
- Others to be determined.

5.2 Survey of existing crop production by commodity

At the present time reliable statistics on supply of tree crop commodities are very scarce, thus precluding the possibility of planning for specified markets. To overcome this constraint, local specialists will be contracted to execute specific terms of reference to generate information which will permit the determination of regional and national production in each of the four Windward Islands. This will entail the collection of data on acreage, cultivars, tree ages, yields obtained, concentration, fruit quality, seasonality, ecological location and others.

5.3 Ecological study to determine best suited growing areas

Available information is of a macro nature and has not been updated for many years. Based on the results of the market study, production surveys and the comparative advantages for fruit crop production, priority crops will be determined for each country. Ecological studies will then be carried out on a regional basis by an integrated team of national and international specialists. The ecological conditions identified within each of the regions will be compared with the respective crop requirements so as to determine the best production areas for each fruit crop.

5.4 Institutional analysis of existing and required infrastructure and facilitating services

The effective implementation of tree crop zoning will require specific infrastructure and the institutionalization of a series of basic services. Baseline information will be collected by national specialists to permit the evaluation of the actual situation and future needs. Some of the actions to be realized will include the following:

- Identification of public and private sector institutions and their services which impact upon fruit tree production and marketing.
- Identification and description of the necessary modifications in these services.
- Identification and description of the requirements in facilitating services so as to effectively implement tree crop zoning.
- Identification and description of new or additional services to be created to implement the zoning.
- Evaluation of existing infrastructure and the needs for modification.

6. IMPLEMENTATION PLAN (two years)

Key Activities	From Month	To Month
1. Market demand study	1	2
2. Crop production survey	1	3
3. Determining priority crops by country	3	3
4. Ecological study	3	8
5. Analysis of infrastructure and Institutional services	1	2
6. Determining best areas for production	9	9
7. Definition of targets	9	9
8. Determining most favourable areas for production/marketing	9	10
9. Needs for Infrastructure and Services	10	11
10. Definition of production/marketing strategy	11	11
11. Discussion of results	12	12
12. Final publication	13	14
13. Follow up	15	24

7. PROJECT COSTS

Activity	Country	Sub-Region
Marketing study		US\$40,000
Crop production survey	US\$10,000	40,000
Ecological study	20,000	80,000
Institutional analysis	2,500	10,000
Analysis of data	5,000	20,000
Publications	5,000	20,000
Others	10,000	40,000
Total	US\$52,500	US\$250,000

PROFILE 3

IMPROVING EFFICIENCY IN FRUIT NURSERIES OF THE WINDWARD ISLANDS

1. **COVERAGE:** Dominica, Grenada, St. Lucia and St. Vincent
2. **DESCRIPTION OF THE PROBLEM**

The propagation of fruit plants at nurseries is the initial step in producing good quality fruits. Many of the problems found in orchards have their origins at the nurseries. If prevention measures are not taken, pests and diseases can easily be introduced into the nursery and from there distributed into the orchards.

There are 17 nurseries in the four Windward Islands: seven in Dominica, one in Grenada, three in St. Lucia and six in St. Vincent. Surveys of these nurseries conducted by IICA in 1986 show that both propagation and planning activities are very deficient areas at most nurseries. Although many of these nurseries produce and distribute a fair number of plants, the lack of technical controls results in production/marketing related problems in the orchards which could be avoided through proper care.

Several of the nurseries in Dominica, St. Vincent and Grenada lack adequate facilities to propagate enough plants of high quality and cleanliness.

Staff at most of the 17 nurseries in the Windward Islands are in need of training in new techniques and methods of propagation, nursery management and maintenance practices, skills which are necessary to produce both quantity and quality plants.

Planning of annual production targets by species, is an instrument which nurseries should use to implement governmental policies and priorities, taking into consideration farmers' demand. However, at most nurseries in the Windward Islands it is common to find mis-allocation of resources, expressed in an overproduction of certain species while producing others far below the level of real demand. This situation is repeated year after year, indicates a deficiency in the planning process and contributes to the high costs of production of plant material.

3. **OBJECTIVES**

General:

To contribute to export development and import substitution through agricultural diversification with fruits.

Specific:

To increase the quantity and improve the quality of plants produced in the nurseries of the Windward Islands.

4. EXPECTED OUTPUTS

- 1) Adequate and sufficient nursery infrastructure and equipment in each of Windward Islands.
- 2) Nursery personnel trained in planning of production targets, nursery management and fruit production/maintenance techniques.
- 3) Standards in place for release of plants of guaranteed quality.
- 4) Production of sufficient plants of the right type to satisfy national production targets.
- 5) Control and preventive measures to avoid the spread of pests and diseases through nurseries in place.

5. DESCRIPTION OF THE PROJECT

5.1 Formulation of Regional and National Propagation Plans.

The propagation plans must be based on real and potential markets for non-traditional fruits from the sub-region. They must also take into consideration the respective countries' comparative advantages as defined by the existing natural resource base.

The information produced by the market and zoning studies (profile # 1), and investment requirements, both physical and institutional, will permit governments to establish national and regional production targets by species, over the short and medium term. These targets will be implemented through the respective national plant propagation programmes and nurseries of each country. For each nursery in each country, national propagation plans will be prepared; these will serve as the basis for the design of infrastructural and equipment needs and for the recruitment and training of technical and non-technical staff.

5.2 Improving Infrastructure and Equipment for Plant Propagation

Nursery infrastructure such as propagation sheds, seedbins, mist propagators, humidity beds, etc. will be upgraded through this component in Dominica, St. Vincent and Grenada. At the same time, unavailable but necessary tools and equipment will be provided to upgrade the propagation process in each of the four countries. These will include soil sterilizers and others. Note that St. Lucia is not included in the infrastructural side since its needs are being attended to by the Structural Adjustment Project being financed by USAID and presently under execution. However, the need for satellite nurseries in St. Lucia, as a means to improve plant distribution, is being studied.

5.3 Training of Technicians and Nursery Personnel

This component consists of the training of technical and non-technical personnel involved in the plant propagation process. Training

will be organized and carried out in such areas as fruit propagation techniques, nursery management and maintenance of nursery fruit plants, prevention and control of pests and diseases, among others. This upgrading of nursery personnel will require the organization and implementation of training modules, workshops, short courses and in-service training. Plant control systems will be established which will define standards and control the final release of plants by the nursery.

5.4 Improvement and maintenance of museum plots

Museum plots serve as the main source of planting materials at each of the nurseries in the Windward Islands. Due to their poor maintenance it is necessary to improve the condition of the plants and to upgrade the quality of the cultivars represented. This entails the evaluation of existing trees, substitution of those showing low performance, introduction of new clones and improvement of management techniques. Each national museum plot will function as an integrated component of the future "fruit crop germplasm bank" (profile 3) to be established in the Windward Islands.

5.5 Citrus virus indexing

Most citrus in the Windward Islands have been introduced from non-certified sources such as research stations, nursery museum plots and others. Few have come from Budwood Registration and Certification Programmes, which are the only ones that can guarantee cleanness of citrus budwood from viruses. As a result it is expected that several of these viruses (exocortis, xyloporosis, psorosis) may have been introduced into the Windward Islands. These represent a potential threat to the citrus industry in the Sub-region. The main reason why these viruses have not yet become an important constraint to citrus production is the fact that sour orange is the only stock being commercially used in the propagation of citrus in the Sub-region. However, the appearance of citrus tristeza virus, could force a radical change from sour orange to other rootstocks.

Citrus virus indexing is the first step to guarantee cleanness of the citrus plant at the nursery and the avoidance of the rapid spread to the orchards. It entails the provision of adequate facilities, the introduction of indicator plants, search and symptomatology studies, indexing of mother plants and decontamination practices.

6. IMPLEMENTATION PLAN (two years)

Key Activities	From month	To month
1) Infrastructural works	1	10
2) Equipment of nurseries	2	12
3) Training of personnel	2	24
4) Definition of nursery standards	3	4
5) Improvement of museum plots	3	12
6) Virus indexing programme	1	24

7. ESTIMATE OF COSTS

Infrastructure	US\$150,000
Equipment	100,000
Training	45,000
Improvement of museum plots	80,000
Virus indexing programme	100,000
Miscellaneous	25,000
Total	US\$500,000

PROFILE 4

FRUIT CROP GERMPLASM BANK FOR THE EASTERN CARIBBEAN

1. **COVERAGE:** Eastern Caribbean
2. **DESCRIPTION OF THE PROBLEM**

One of the major constraints to the production of fruits in the Eastern Caribbean is the lack of good sources of high quality and "clean" cultivars of fruit crops for commercial propagation and cultivation. Most nurseries within the sub-region report a shortage of good planting material, as museums are either non-existent or in such poor condition that, rather than guarantee the cleanliness of the plants produced, they constitute a major focus of infestation and distribution of pests and diseases.

Almost all the islands in the Eastern Caribbean have at one time or another made attempts to introduce and establish a variety of fruit species and cultivars. The result has always been the same, plants from introduced material, after propagation, are planted in plots that eventually are abandoned because they decline due to lack of proper care. Consequently, new introductions are made and the cycle begins anew. Costs in financial and human resources become higher each time and in each instance the chances for the introduction of new pests and diseases increases.

On the other hand, most of the Caribbean islands have rich local genetic resources of fruit species which, in spite of their commercial importance and the existence of trees of excellent characteristics, are still propagated from unselected seedlings.

A joint effort of the Eastern Caribbean countries to create and manage a Germplasm Bank of fruit crops species would result in numerous advantages for the development of fruit crops in the region, including the lower cost and continuous supply of high quality planting material and the reduction of the chances of introducing new pests and diseases to the region.

3. **OBJECTIVES**

General:

To contribute to export development and import substitution through agricultural diversification with fruits.

Specific:

Establishment and maintenance of a germplasm bank for the selection, propagation and distribution of local, regional and extra-regional fruit clones of outstanding characteristics for the Eastern Caribbean.

4. EXPECTED OUTPUTS

- 1) Outstanding fruit clones within the region identified and selected.
- 2) Mechanisms in place for the introduction, from reliable sources, of fruit species and cultivars with high characteristics and with real and/or potential markets.
- 3) Infrastructure in place to propagate and maintain the selected and/or introduced clones in the best possible condition, maintaining their purity and cleanness.
- 4) Trained technicians, from the region, in the collection, handling and distribution of fruit seeds and budwood.
- 5) Reduction of probability of introducing new pest and diseases into the region and reduced spread of pests and diseases through nurseries.
- 6) Availability of seeds and budwood of outstanding quality clones, at lower cost, to meet demand from member countries.
- 7) Applied research, including study of the performance of different fruit species and cultivars, suitable propagation methods for individual tropical fruit species and other related subjects.

5. DESCRIPTION OF THE PROJECT

5.1 Establishment of Infrastructure and Equipment

This component consists of the construction and/or rehabilitation of facilities in the country of location of the Germplasm Bank. It also includes the acquisition of necessary equipment and tools to operate the Bank. Adequate land will have to be provided with proper irrigation, drainage, access roads, etc. Facilities such as propagation sheds (saran shed, soil shed, mist propagator, humidity beds, etc.), offices, training room, storage room, cool room, soil and seed treatment areas, laboratory and others will be needed.

Propagation tools and maintenance equipment including secateurs, pruning shears, knives, handsaws, power saws, ladders, tractors, lawn mowers, sprayers, mist blowers, among others will be required.

5.2 Selection of Local and Regional Fruit Clones

This component is directed towards the selection of outstanding local and regional fruit clones. Priority will be given to those fruits for which, although grown commercially in the region and in spite of the existence of trees of excellent characteristics, their propagation is still being done from non-selected sources. Such fruits include soursop, breadfruit, golden apple, passion fruit, sugar apple, tamarind and others. For other major crops such as mango, avocado and lime, the selection should be directed to specific characteristics, e.g. early and late bearing, resistance to given problems and others.

The first phase of this component should consist of general screening of fruit trees at the country level, followed by pre-selection, monitoring, evaluation and final selection of clones.

5.3 Introduction of Planting Material

Fruit cultivars recognized for their high overall quality characteristics, and growing in similar ecological conditions to those found in Eastern Caribbean countries, will be introduced from reliable sources, screened, propagated and eventually distributed to member countries.

5.4 Training

Many cultivars of fruit species will be grown at the Germplasm Bank. This will provide the opportunity to train technicians from member countries in proper management of these crops and in methods to collect, store, handle and ship seeds and budwood. This will be achieved by the organization of short practical courses and/or in-service training visits.

5.5 Fruit Plot Establishment and Maintenance

The establishment of the fruit plot will be initiated during the second half of the first year of the Project. Activities will include the preparation of land, planting of fruit trees and post-planting care of the trees, e.g. cultural practices, etc.

5.6 Distribution of Planting Material

This component consists of the establishment of efficient and lowest cost channels for distributing planting material from Bank to nurseries in member countries. In its initial phase, and because of a transition period while the original plants develop to sizes permitting the supply of sufficient quantities of budwood, the Bank will supply limited amounts of budwood to establish small foundation blocks in each of the nurseries of the member countries. These foundation blocks will have a life-span of less than two years and will supply budwood demanded by each particular nursery. The availability of the originally introduced clones at the Germplasm Bank will facilitate a resupply of the temporary foundation blocks as frequently as required. Once mature plants are established, the respective country nurseries will be able to plan their needs and solicit, opportunely, the required amounts of seeds and budwood.

5.7 Applied Research

The opportunity of having established plots of different fruit species and cultivars will permit engagement in applied research such as phenological observation, effect of chemical sprays, fertilization frequency and rates, among others. It may also include a citrus virus indexing programme which would help to maintain virus-free distribution of citrus budwood.

5.8 Location of Germplasm Bank

The Germplasm Bank should be located on one of the Windward Islands having the following characteristics:

- a) Freedom from major pests and diseases.
- b) Availability of a minimum of 80 acres of land having good soil conditions, irrigation and drainage potential and relatively easy access to port facilities.
- c) The existence of some basic infrastructure so as to minimize initial capital investment.
- d) Support of local government in terms of willingness to provide facilitating services and issue permits to introduce foreign plant material.

Some of the components identified can be individualized for formulation and/or execution, e.g. training of technicians, applied research and selection of local/regional clones. Several existing regional and international organizations should cooperate on the formulation and implementation of this multinational project. This would tend to optimize the use of human and financial resources. This project should be implemented in two parts: the establishment, which will have a duration of five years, and the operation of the Bank on a permanent basis, to begin one and one-half years after establishment.

6. IMPLEMENTATION PLAN (ten years)

Key Activities	From year	To year
1) Selection of site	1	1
2) Infrastructural work	1	2
3) Introduction of planting material	1	3
4) Establishment of fruit plots	1	5
5) Selection of local clones	1	5
6) Distribution	2	10
7) Research	2	10+
8) Training	1	10+
9) Maintenance	1	10+

7. PROJECT COSTS

Establishment:

- Infrastructure and equipment	US\$500,000	
- Introduction of plant material & propagation	80,000	
- Land preparation and planting	50,000	
Sub-total		630,000

Annual Operational Costs: (1)

- Selection of local clones	20,000	
- Maintenance of fruit plants	60,000	
- Training	25,000	
- Distribution (2)		
- Research	20,000	
Sub-total		125,000

Personnel: (3)

- Administration	20,000	
- Guards	7,000	
- Field personnel	38,000	
- Others	7,000	
Sub-total		72,000

Miscellaneous	35,000	35,000
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Total:

- Establishment		630,000
- Annual operation		232,000

-
- (1) The Germplasm bank will begin to produce income from the second year onward. It is estimated that annual operating costs will be fully covered by earned income from sales of planting material and fruit produced in orchards from the eighth year onward.
 - (2) This cost will vary with demand and will be covered by the solicitor of the planting material.
 - (3) Technical staff will be supplied by regional and extra-regional organizations.

PROFILE 5

GENERATION AND TRANSFER OF TECHNOLOGY FOR PRIORITY FRUIT PRODUCTION AND MARKETING IN THE WINDWARD ISLANDS

1. **COVERAGE:** Dominica, Grenada, St. Lucia and St. Vincent
2. **DESCRIPTION OF THE PROBLEM**

Tropical fruits are grown in the Windward Islands by small farmers on a small scale, normally intercropped with traditional tree crops, such as coconuts and bananas, or in some cases with vegetables and legumes. Deriving relatively insignificant economic returns from these non-traditional fruits, farmers have not been too concerned about improving or maintaining high levels of cultural practices. Consequently, productivity and quality of non-traditional fruit are low. Producing only small volumes of quality produce, the Windward Islands, in general, have not been able to compete in extra-regional markets on a continuous basis. The situation has thus developed into a vicious circle: farmers are reluctant to apply adequate cultural practices because they are unsure of a market and it is difficult to break into the market because quality and volumes are low due to inadequate cultural practices.

Past efforts to stimulate improved production of non-traditional fruits have tended to be top-down operations whereby farmer participation has been obtained by providing free or subsidized plants and inputs.

Efforts for the generation and transfer of technologies have tended to concentrate on traditional crops, e.g. bananas, or food crops, mainly roots and vegetables.

Relatively little or no attention has been given to research on specific characteristics of non-traditional fruit species and cultivars which may affect production, postharvest handling or market demand, either on a country or regional basis.

Most cultural practices applied to fruit crops are conducted in an empirical way, using imported technology from countries that may have very different ecological and socio-economic conditions. Since the cost of fertilizers and other inputs vary from country to country, economic rates of application and frequency should be worked out on a country basis.

Decision makers and planners often attempt to import technologies from other countries without going through the necessary screening, adaptation and validation process. By attempting to minimize investment in research they often cause farmers to make costly mistakes.

Very little technical information based on the actual situation of fruit production/marketing in the Windward Islands is available for training extension agents and farmers. There is a marked need for practical data that have immediate application in the field, to be generated through applied research in specific countries.

Available information and literature relevant to the production and marketing of fruit crops in the Caribbean tends to remain in the libraries and university files and is not accessible to potential users. As a result, farmers often make mistakes in growing fruit crops, leading to unnecessarily high costs of production and often growing cultivars with limited genetic and market potential.

3. OBJECTIVES

General:

To contribute to export development and import substitution through agricultural diversification with fruits.

Specific:

Identify, organize and assess in the execution and transfer of applied research to develop appropriate technological packages for the production and postharvest handling of priority fruits.

4. EXPECTED OUTPUTS

- 1) Technological packages for the production, postharvest handling and marketing of priority fruit crops.
- 2) Personnel trained in preproduction, production and postharvest handling techniques of priority fruits and methods for transferring these techniques to farmers.
- 3) More efficient research and extension services following a priority commodity systems approach.
- 4) Availability and improved distribution systems for useful information, techniques and technologies on fruit production/marketing in the Eastern Caribbean.

5. DESCRIPTION OF THE PROJECT

5.1 Strengthening of Research and Extension Services

In each of the Windward Islands, the existing extension service is characterized by relatively small numbers of extension personnel responsible for servicing large numbers of small farmers in the production of a wide variety of crops and small animals. Methodological approach varies between countries, districts and between extension agents. Most extensionists spend their time resolving problems on an ad hoc basis. Research officers are very few and research topics tend to be selected empirically and unrelated to priority topics in terms of product marketability. Neither of these groups work closely with the existing Produce Chemists Laboratories (PCL) and all function with little backstopping and with the minimum in tools, instruments and resources.

This component of the project will increase the capabilities of the research, extension and PCL services for the production and postharvest handling of quality fruits of priority species and cultivars. This will be accomplished by training and integration of research, extension and PCL personnel into a priority commodity systems and market oriented approach to problem solution. Tools and materials will be supplied as needed for the execution of research and extension training activities. These may include pruning equipment, sprayers, graphical aids, projectors, hand refractometers, calipers, tensiometers and other supplies.

5.2 Generation of Technology (applied research)

This component consists of the planning and execution of applied research, which have a direct application in improving the yield and quality of priority fruits and/or increasing the economic return from existing plots. Examples of topics for research include: planting density according to cropping systems; fertilization rates and frequency of application; determination of when and how to prune; effect of pruning on yield and ease of harvest; integrated management of weeds with or without the combination of traditional methods; rootstock/scion relationships and their effect on yield and quality; use of chemicals to delay or advance fruit maturation; improvement of quality and shelf life; integrated pest and disease management and prevention measures; maturity indices and harvesting techniques, and farming systems economics.

This component also includes the preparation of technological packages for priority crops and other documentation related to the generation of technology to be used by the extension agents for transfer, especially through farmers organisations.

5.3 Transfer of Technology

This component consists of the training of technical personnel and farmers in fruit production, postharvest handling and marketing. Some of the topics to be covered will include the following: nursery management, proper cultural practices, alternative cropping systems, topworking techniques, planting methods, time and methods of harvest, cultivars and their characteristics and particular needs, market standards and project formulation, among others. This training will be carried out by organizing field days, training modules, roundtable discussions, workshops, short courses and on-farm visits.

Two types of training materials will be prepared: that oriented towards technicians and that directed towards farmers.

The transfer of technology will be carried out at three levels. The first refers to transfer of locally generated technologies from technician to technician and from technician to farmer. The second includes the screening of technologies and dissemination at the national, regional or extra-regional level. The third refers to the screening of technologies generated in other countries and introduced into the host country.

Given the multinational nature of this project the training of technicians, when possible or desirable, will be conducted on a sub-regional basis. Farmer training will be carried out on a country basis; however, visits of farmers between countries of the sub-region will be organized to facilitate interchange of experiences, methods and materials.

6. IMPLEMENTATION PLAN (five years and over)

Key Activities	From year	To year
Training	1	5+
Research	1	5+
Development of technological information	2	5+
Publication/dissemination of information on fruit production/marketing	1	5+

7. PROJECT COSTS

Type Activity	Cost per Year	Cost 5-Years
Training	US\$25,000	US\$125,000
Research	80,000	400,000
Technological packages (12 commodities)		24,000
Publications		50,000
Others (equipment, etc.)		60,000
Total		US\$659,000

PROFILE 6

STRENGTHENING FARMERS ORGANISATIONS IN THE WINDWARD ISLANDS

1. **COVERAGE:** Dominica, Grenada, St. Lucia and St. Vincent
2. **DESCRIPTION OF THE PROBLEM**

The four Windward Islands have common goals in respect to diversification through import substitution and export development. Since businesses contribute to the generation of foreign exchange and/or produce items which substitute for imports, it might also be said that the Windward Islands, as a group, are interested in promoting and increasing the efficiency of small businesses. In fact development banks, national development foundations and donor agencies are dedicating substantial resources to strengthening small businesses within the Sub-region. One type of small business benefiting only marginally from these efforts are farms and newly formed farmers organizations.

Whether for import substitution or agricultural export development, success of any national effort in the Windward Islands will be contingent upon having the active and effective participation of small farmers. Given the characteristics of small farm agriculture within the Sub-region, this will require the strengthening of organizations of small farmers, in some cases, and the formation of new farmers organizations in others. Since few small farmers have access to the information needed for determining what to produce, when to produce, how much to produce and when and where to sell, there is a definite need for strong second level farmers organizations which can provide key facilitating services, including decision making information and managerial training.

Presently, neither public sector institutions nor small farmer organizations have the established systems required to generate information needed for effective decision making. Past efforts to resolve the "information" problem have resulted in donations and purchases of "hardware" and "software" (often incompatible within the same country and between countries) while very little or no effort has gone into "organizational-ware" - the determination of information needs for effective decision making and the organization of the system and the managerial capacity to satisfy those needs.

Without effective information systems small farmers resort to traditional sources. The resulting market uncertainty leads to the farmer spreading his risks by producing a wide variety of cash and food crops. The ramifications of the resulting farming systems can be summarised as:

- periodic gluts and scarcities;
- many small farmers producing small volumes of a wide variety of products of low quality;
- public sector research and extension activities are spread over such a broad range of commodities that results are parcial and produce little impact at the level of the farmer or on the national economy, and
- inability to meet stringent credit requirements, among others.

While many attempts have been made to resolve the marketing constraint, success has eluded planners. Public sector marketing boards have proven ineffective in satisfying the small farmers needs for both domestic and export marketing services and governments are now beginning to look for alternative models which will allow a more active participation of the private sector.

3. OBJECTIVES

General:

To contribute to import substitution and export development through agricultural diversification with fruits.

Specific:

To strengthen farmers organizations in order to:

- develop domestic marketing systems and
- promote joint marketing of non-traditional export crops.

4. EXPECTED OUTPUTS

Farmers Organisations:

- 1) Trained persons in small business management, information systems, postharvest handling and marketing.
- 2) Information system to satisfy the needs of farmers (1st level) and farmers organizations (2nd level) designed and in place.
- 3) Access to credit for marketing.
- 4) Infrastructure and equipment for domestic and export marketing in place.

Ministries of Agriculture:

- 5) The MOA will have access to supply information generated at the level of farmers and farmer organizations.
- 6) Research and extension systems will be more effective as attention will be given to priority problems within a commodity system, prioritised by farmers organisations.
- 7) Improved coordination and integration of development projects oriented towards farmers organizations.
- 8) New projects identified to support the development of farmers organisations.

Sub-Regional Level:

- 9) Improved facilitating services (information, training, technical assistance) available for farmers organizations.

These outputs will result in small farmers having:

- easier access to credit;
- access to information for planning production and marketing;
- access to new or improved technologies, and
- additional market alternatives.

5. DESCRIPTION OF THE PROJECT

The marketing of food crops (fruit, vegetables and roots) in the Windward Islands is a highly risky business. Joint marketing from the Windward Islands is most likely to be achieved with the formation of strong farmers organizations representing the producers of the commodities to be exported. To be effective, such organizations must have good management, administrative and marketing skills and effective organisation of information. These, combined with efficient facilitating services, will help reduce risk and lead to higher net incomes for members. Higher net incomes are closely related to "dependable" markets. Facilitating services, including market information, can best be provided through second level (federations) of farmers organisations.

The first stage in the development of this project will be the identification and strengthening of second level farmers organisations in each of the participating countries. Emphasis will be given to building on past experiences and in using available national expertise and horizontal co-ordination to make that expertise available to neighbouring islands. Once this first goal has been reached, further efforts will include the strengthening of key facilitating services and the identification and formulation of specific projects to overcome specific marketing, production and credit constraints.

Sub-regional co-ordination of activities of common interest will be carried out by an existing regional or international organisation.

The major components of this Project are the following:

5.1 Developing Management Potential

For each 2nd level farmers organization to be assisted an evaluation will be made of its present management structure, information needs and required services. A plan of training activities will be prepared and implemented during the first year of the Project. Methodologies and information systems will be designed and put in place as required.

5.2 Developing Marketing Potential

Market demand studies will be conducted on the respective domestic, regional and extra-regional markets with support from existing marketing specialists from within the region, particularly CATCO. Marketing strategies will be defined and marketing projects will be formulated to execute the strategy. When feasible, 2nd level farmers organisations will take over some or all of the respective marketing boards hands-on marketing functions. Where infrastructure is required for postharvest handling, projects will be formulated and

implemented. Where potential exists for export marketing, assistance will be solicited from CATCO and other institutions in developing export marketing expertise and strategies. The eventual goal of these actions will be to lay the groundwork for the creation of a Windward Island marketing entity with farmers organisations as major shareholders.

5.3 Developing Production Potential

Based on market potential, priority crops will be selected for development for domestic, regional and extra-regional markets. For each commodity to be marketed through the 2nd level organization, priority constraints affecting productivity, product quality and production costs will be identified and infrastructural, training, research and extension programs designed to control or eliminate them. These efforts will be co-ordinated closely with national and regional research and extension programs.

5.4 Credit

Credit will be required for both production and marketing. Since the marketing service will be provided by a 2nd level organization capable of meeting collateral requirements, credit will be channeled directly through the respective development bank. In the case of production credit, other arrangements will be made through National Development Foundations which will guarantee the bank loans channeled through them to farmers organizations, thus reducing or eliminating collateral requirements at the small farmer level.

5.5 Sub-Regional Coordination

An existing institution active within the region or Sub-region will be selected to co-ordinate the Project activities. This entity will provide administrative backstopping and coordination for organising meetings, workshops, seminars, short courses, research activities, project formulation, information and horizontal technical cooperation. An intensive effort will be made to coordinate closely with other institutions and donor agencies involved in complementary actions.

6. IMPLEMENTATION PLAN (four years)

Key Activities	From Month	To Month
Strengthening/creation of 2nd level farmers organizations	1	12
Developing marketing potential	6	48
Developing production potential	6	48
Credit	6	48
Sub-regional Coordination	1	48

7. ESTIMATED COSTS

Activity	Per Country	Four Countries
Strengthening/creation of 2nd level farmers organizations	US\$ 80,000	US\$ 320,000
Developing marketing potential	400,000	1,600,000
Developing production potential	150,000	600,000
Credit (to be determined)		
Sub-regional coordination		420,000
Total		2,940,000

PROFILE 7

FORMULATION OF PROJECTS FOR ORGANIZED PRODUCTION AND MARKETING OF SELECTED FRUITS AT THE COUNTRY LEVEL

1. **COVERAGE:** Any one or all of the following countries: Dominica, Grenada, St. Lucia and St. Vincent.
2. **DESCRIPTION OF THE PROBLEM:**

Development projects to strengthen the fruit sub-sector are diverse and relatively numerous in each country making up the Sub-region. Most of the actions have concentrated on selected aspects of production. For example, of approximately 40 different projects either terminated, in development or in-pipeline, within the Sub-region (Table A-9 of Volume I: Diagnosis), some concentrate only on propagation, others on diverse aspects of production, some on tree rehabilitation or top working and others on plant protection, etc.. This approach, while attacking many of the problem areas, does so in a rather haphazard fashion with a large number of participants acting in an uncoordinated manner. Even when the individual actions are successful they seem to have little economic impact at the level of the small farmer. ~~Projects concentrated on production and marketing of selected fruits.~~

On the other hand, consulting and government trade missions have identified markets and interested importers and selected ~~markets~~ as extra-regional markets. Upon returning to their respective countries they normally discover that ~~these markets are not viable~~ volumes of ~~production~~ ~~are not available~~ at competitive prices.

The end result is that while considerable resources are expended upon pre-production, production and marketing activities actual exports increase very slowly, if at all.

3. **OBJECTIVES**

General:

To contribute to export development and import substitution through agricultural diversification with fruits.

Specific:

Formulate economically feasible projects for the organized production and marketing of specific priority fruit crops in each country.

4. **EXPECTED OUTPUTS**

Projects for the commercial production/marketing and agro-processing of selected fruit commodities from the Windward Islands.

ATTACHMENT A TO PROFILE 7

NOTE: The following profile gives an indication of the structure of a project formulated using a commodity systems approach. Specific components will vary depending on the commodity and the participating countries.

1. **TITLE:** Developing papaya production and marketing capacity
2. **COVERAGE:** Any one or all of the following countries: Dominica, Grenada, St. Lucia and St. Vincent
3. **DESCRIPTION OF THE PROBLEM**

The supply of papaya in general is insufficient to meet the growing domestic demand, particularly in the tourist trade. Present volumes of production are small, of poor quality and have an excessively wide variation of characteristics. Consequently, papaya has not been able to make serious in-roads in either domestic, regional or extra-regional markets.

The principal causes for the above described situation are related to production and marketing constraints. These include pests and disease problems, e.g. Bunchy top and Erwinia; limited selected genetic material; limited technical know-how of both technicians and farmers; poor delivery systems of technology, and lack of marketing information and systems.

4. **OBJECTIVES**

General:

To contribute to import substitution and export development efforts through agricultural diversification with fruits.

Specific:

Develop the capacity for the commercial production and marketing of papaya for domestic and external markets.

5. **EXPECTED OUTPUTS**

- 1) Better quality papaya.
- 2) Established linkages with other papaya producing countries in the Eastern Caribbean.
- 3) Inventory of pests/diseases of papaya by country.
- 4) Technological package available and people trained in its use.
- 5) Increased production and productivity.
- 6) Cultivars and lines tolerant to pests/diseases and other production problems.
- 7) Additional market alternatives.
- 8) Planned production and marketing of papaya for domestic (tourist, agro-processing and others) and Sub-regional markets.

6. DESCRIPTION OF THE PROJECT

All four of the Windward Islands have favourable conditions for growing papaya. The production, however, must be adapted to domestic and external demands. Once the most suitable areas for production have been identified a production/marketing programme, with production targets, can be prepared for the particular country.

In order to reach the established production targets a series of activities will have to be developed which will create the local capacity to meet the targets. Since many of the activities will involve research and training, as well as production, this project will be executed as a joint effort between the public and private sectors. The institutional strengthening activities will be carried out simultaneously with the private sector production activities.

In each country where this project is executed, activities will be developed in the following five components:

6.1 Applied Research and Development

This component will be developed taking into consideration the whole commodity system, including pre-production, production, harvesting, post-harvest handling and marketing. In each of these areas activities related to validation, adaptation and design of new technology will be included.

6.2 Production

Under normal conditions the applied research should precede the production activities. In the case of papaya, however, technological packages have already been developed in areas/countries with similar ecological conditions (Barbados, Dominican Republic, Puerto Rico) which can be quickly adapted to the Windward Islands. This rapid adaptation will permit the opportunity for a preliminary validation of the technology in the early stages of the project and testing of market conditions.

This component will consist of five principal activities. The first will be the introduction of planting material from reliable sources. The second activity will be the propagation of these planting materials. Thirdly, participating farmers will be selected to grow for specific markets, in the first instance for the pilot commercial plots and in the second instance for full commercial production. The fourth activity will be the establishment of the pilot commercial plots. In this case these pilot plots will be developed simultaneously with the research activities. Finally the full scale commercial operations will be established as part of a Sub-regional joint effort. These will be initiated after the technological package has been adapted to the specific conditions of each participating country.

6.3 Marketing

The principal markets for papaya are thought to be the domestic and extra-regional markets, e.g. UK, Holland, USA and Canada. The domestic market

includes the local population, the tourist sub-sector and the agro-processing sub-sector. Market demand studies will be carried out to determine the extent of each market.

Under this component of the project the most favourable markets will be identified and developed for each country. The production from the pilot commercial plots will be used for market testing. During this phase proper postharvest handling practices, packaging and labeling will be determined and validated.

Where determined feasible the production/marketing of papaya will be in the hands of small farmers and their respective organisations. Efforts will be made to assist these small farmers organisations in the establishment of the proper infrastructure for the postharvest handling of papaya (and other produce) and in the training of the human resources in the proper techniques.

6.4 Training

The training component will be carried out at two different levels; the training of public sector technicians on the one hand and the training of farmers on the other. Training will be executed through short courses, workshops, seminars, round tables, field days and in-service training. The training will cover all aspects of the fruit commodity system, including pre-production, production, harvesting, postharvest handling and marketing/merchandising. Technicians will be trained so as to guarantee a continuous, systematic and effective extension service to the farmers. They will be responsible for the training of the farmers.

6.5 Credit

This project is oriented primarily towards small farmers thus it must assure a source of financing for commercial production and marketing. This credit component will be developed through national development banks and/or national development foundations. It will include a 12 month grace period and will take into consideration the small farmers collateral limitations.

7. IMPLEMENTATION PLAN (five years)

Activities	From Year	To Year
Research:		
- Validation	1	3
- Adaptation	1	4
- Design/testing new technology	1	4
Production:		
- Introduction of planting material	1	2
- Propagation	1	3
- Pilot commercial plots		
. selection of farmers	1	1
. establishment	1	2
- Full commercial production		
. selection of farmers	2	3
. establishment	2	4
Marketing:		
- Test marketing	2	3
- Established marketing programme	3	5
Credit:	2	5

8. PROJECT COSTS

The cost of this project is in function of the market conditions and the established targets for each country and therefore cannot be determined at this point. Principal cost components will include the following:

- national and international technical personnel and non-technical personnel;
- inputs and other materials;
- equipment and tools;
- transportation;
- infrastructure;
- credit funds, and
- others to be determined.

ATTACHMENT B TO PROFILE 7

1. **TITLE:** Rehabilitation of Breadfruit
2. **COVERAGE:** Any one or all of the following countries: Dominica, Grenada, St. Lucia, St. Vincent.
3. **DESCRIPTION OF PROBLEM:**

~~St. Vincent is the principal supplier of breadfruit with breadfruit.~~ Smaller amounts are transhipped to St. Lucia from St. Vincent for this same market. Buyers of breadfruit from Florida have been unable to obtain the volume of quality fruit desired in Grenada or the other islands making up the sub-region. In general, ~~the demand from Europe and North America~~ ~~exceeds~~ the supply of quality breadfruit.

Many, if not most, of the breadfruit trees in the Windward Islands are older trees, i.e. greater than 30 years, and have a high percentage of dieback of limbs, significantly reducing yields and fruit quality.

Most breadfruit trees grown in the sub-region are of a very tall type. Due to this height the fruit are difficult to harvest and many remain on the tree or fall to the ground and are lost. A high percentage are seriously damaged during harvest. The harvesting process itself is difficult, time consuming, and expensive.

A wide variety of types of breadfruit exist in each of the Windward Islands. These different types not only produce a variation of fruit types in respect to size, shape, colour, and texture, but also perform differently in their growth habits. Most tend to dominate in vertical growth whereas others extend themselves equally in both directions. Although few in number, some are found to have dominance in horizontal growth. The localized ecology directly influence these growth habits. Consequently, the pattern of rehabilitation cannot be standardized and applied research is desirable in determining the most suitable patterns for each region.

Farmers and technical personnel within the sub-region lack training and experience in appropriate rehabilitation practices.

4. **OBJECTIVES:**
 - General:** To contribute to import substitution and export development efforts through agricultural diversification with fruits.
 - Specific:** Increase the availability of quality breadfruit suitable for export to extra-regional markets.
5. **EXPECTED OUTPUTS**

- 1) A core group of technicians, field personnel, and farmers will be trained in the proper methods of rehabilitation of breadfruit trees.
- 2) Best suited patterns of rehabilitation adapted/developed to specific regions.

- 3) Reduction in the harvesting labour costs.
- 4) Increase in the quantity of quality fruit suitable for export.
- 5) Increase in the quantity of fruit exported.

6. DESCRIPTION OF THE PROJECT

Breadfruit is presently grown in all of the Windward Island. All the islands have favourable ecological conditions for growing breadfruit and although a large number of trees can be found, the supply of quality fruit is less than the existing demand.

It is felt that a rapid increase in the quantity of quality fruit can be achieved through a systematic programme of rehabilitation of existing breadfruit trees. However, this goal can only be reached through a series of closely coordinated actions involving training, breadfruit tree rehabilitation, and applied research to adapt and improve the rehabilitation process to meet local conditions.

6.1 Training

Training activities will be carried out at the level of technicians, field personnel employed with the MOA, farmers organizations, and with farmers themselves. The training will include a description of the process of rehabilitation and its effects on yields, quality and ease of harvesting. Inservice training will be the principal method of training all personnel involved in the rehabilitation process. Demonstration farms will be utilized to show the positive effects of rehabilitation. This training will be initiated by specialists and will take place as a preparatory step for the rehabilitation component.

Approximately one year after pruning, and as the fruit becomes available, farmers and technicians will be trained in appropriate harvesting techniques, to maximize fruit quantity and quality.

6.2 Rehabilitation

The first step in rehabilitation of breadfruit is the screening of trees in those areas of high concentration and access. A promotion campaign will be undertaken to encourage farmer participation. Trees within the demonstration farms will be the first to be rehabilitated.

Teams of MOA field personnel, directed by a MOA technician previously trained in appropriate techniques, will be formed and will carry out the rehabilitation work programme assigned.

6.3 Applied Research

Simultaneously with the inservice training and rehabilitation, applied research will be carried out to adapt and improve known rehabilitation techniques. Comparisons will be made between medium and heavy pruning, topping vs trimming, response of different types of breadfruit and others. These comparisons will be made in terms of costs and production, including both yield and quality.

Other applied research will be defined and carried out according to local interest and needs.

7. IMPLEMENTATION PLAN

<u>Activities</u>	<u>From Year</u>	<u>To Year</u>
Training	1	5
Rehabilitation	1	4
Applied Research	1	5

Targets per country: Increase in exportable production of 275 tonnes of breadfruit. This can be obtained from 2500 trees.

8. PROJECT COSTS PER COUNTRY

Labour Costs	US\$40,000
Equipment:	
-Vehicle	20,000
-Rehabilitation tools	10,000
-Operation costs	5,000
-Harvesting tools, equipment	6,000
-Miscellaneous	10,000
TOTAL COSTS	US\$91,000

PART IV
APPENDICES



APPENDIX 1

CONCLUSIONS DOMINICA

CONCLUSIONS DOMINICA

The following conclusions have been summarized from the Dominica country report prepared by IICA during the period January - July 1986 and published as a separate document.

In the preparation of the original country document, the following persons made valuable contributions with information and/or special reports.

<u>NAME</u>	<u>SUBJECT AREA</u>
Claudia Bellot	Produce Chemist Laboratory
Colin Bully	Institutional analysis
Hannah Clarendon	Development Projects
Kerwin Ferreira	Agricultural Credit
Neville Graham	Farmer Organizations, non-governmental organizations and exporters
Felix Gregorie	Forestry Division
Oliver Grell	Natural resources, human resources, farmer organizations and institutional analysis
Charles James	Information Unit
Cecil Joseph	Export marketing
Milton Lawrence	Agro-processing
John McIntyre	Plant propagation
Anthony Sorhaindo	Crop characteristics, cultural practices and plant propagation
Johnathan St. Jean	Trade statistics and transportation
Clemencia Victor	Research
Jennifer White	Agricultural Policy
John Winter	Marketing

The supervision, assembly and final editing of the country report was the responsibility of: Jerry La Gra, marketing specialist and project coordinator, IICA Office in St. Lucia; Rafael Marte, fruit production specialist, IICA Office in Barbados, and Urban Martin, Plant Pathologist and IICA Office Co-ordinator in Dominica.

CHAPTER I: NATURAL RESOURCES

1. Dominica is the largest of the Windward Islands being 47 km long, 26 km wide and having an area of 760 km².
2. The climate is closely related to the extremely broken topography. Average annual temperatures range from 21 degrees C to 27 degrees C, depending on height above sea level. Mean day temperatures range between 29 degrees C and 32 degrees C and mean night temperatures from 20 degrees C to 23 degrees C with the warmest period in June and the coolest in January.
3. Annual rainfall ranges from 2500 mm on the coast to over 7500 mm in the mountainous parts of the island. The dry season lasts from February to May and the rainy season from June to January, with the wettest months during June-October.
4. Dominica has been hit by several hurricanes in this century, the most recent being David in 1979 and Allen in 1980.
5. Relative humidity ranges between 70% and 90% with little seasonal variation at sea level in open surroundings.
6. With Dominica's broken topography daily hours of sunlight into certain production valleys will vary greatly.
7. Approximately 85% of the total land area of Dominica has a slope greater than 20%. Only 2% of the land area has a slope of less than 5%.
8. Geologically, Dominica is relatively young and still shows signs of current volcanic activity. Parent materials consist of older volcanic deposits, marine deposits and more recent volcanic deposits. Dominican soils tend to be highly permeable as virtually the whole of the island is volcanic.
9. The soils of Dominica form a complex pattern due to the great rainfall range and the variation in weathering of volcanic deposits. Some 75 soil types have been identified.
10. Dominica has a diversity of life zones and micro-climates predominantly due to the influence of climate, e.g. the centrally located rain forest from which departs a descending series of seasonal or dry evergreen forests and mountainwards, an ascending series of montane forests, both cases due to climate becoming progressively less favourable to plant growth.
11. Land capability, based primarily on slope, indicates that most of Dominica is suitable mainly for tree crops, forest and non-agricultural use.

Government Controlled Lands

12. National forest reserves controlled by Government and mainly located above 1,000 feet elevation are estimated at 35,000 acres. These lands tend to be very steep, have high rainfall, are inaccessible and generally unsuitable for agricultural production.

13. Government, over the past 20 years, has acquired eight estates located below 1000 feet elevation. Two of these, (Newfoundland and Bellevue Chopin) have been parcelled and sold to farmers. Of the remaining six estates, five have tenants renting the lands and plans are underway to subdivide and allocate these lands to farmers for purchase. The final estate, Morne Plaisance, is presently being logged by a private company.
14. In general, governmental policy is to settle small farmers on government lands and provide them with necessary infrastructure like roads, schools, credit and marketing facilities. Priority in all cases is given to existing tenants. To undertake these development plans donor assistance is being sought.
15. At the present time, maps exist which indicate crop capability according to soil, slope, altitude and rainfall. These maps are useful in determining the most suitable areas for specific crop production. They are inadequate for determining best crop alternatives, as this requires socio-economic information.

CHAPTER II: HUMAN RESOURCE BASE: SOCIO-ECONOMIC CHARACTERISTICS OF DOMINICAN FARMERS

1. The national population of Dominica in 1984 was 83,266 inhabitants, with approximately 35% residing in the capital, Roseau.
2. The population is predominantly of African decent although it contains one of the largest Carib Indian settlements in the Caribbean. The Caribs represented some 3% of the total population in 1981.
3. Of the 1981 population of 77,750 persons, females represented 50.2% and males 49.8%. Females outnumber males in the 35+ age categories.
4. Among Dominican farmers, 76% are male and 24% are female.
5. Women play the predominant role in agricultural marketing. Nearly all domestic market vendors are female and of 322 registered hucksters, 80% are women.
6. Almost two-thirds of the population is under 25 years of age. The labour force represents approximately 35% of the total population. Some 33% of the labour force is employed in agriculture, forestry and fishing.
7. Youth do not look favourably upon agricultural employment and out-migration to regional and extra-regional destinations keeps population growth low, i.e. .62 annually.
8. A varied multi-crop farming system has evolved as a result of diverse influencing factors such as plantation agriculture, small size of farms, changing market conditions, soil types, rainfall patterns, slope and tenurial arrangements, to name a few.
9. Cash crops in Dominica have gone from sugarcane to cocoa, to coffee, to citrus and finally to bananas, mainly because of changes in market demand.

10. Some 88% of all land parcels on the island have tree crops present, the principal ones being coconut, citrus (orange/grapefruit/lime), avocado and mango.
11. The 1976/77 Agricultural Census, revealed that agricultural land was unevenly distributed, e.g. 9% of holdings held 55% of the land. However, this has been modified somewhat by government's purchasing of large estates and distributing these lands to small farmers.
12. Nearly 70% of agricultural land is freehold; land held in "common" can be a deterrent to agriculture as occupants are reluctant to make fixed investments such as tree crops.

CHAPTER III: CROP CHARACTERISTICS AND GROWING CONDITIONS

Cultivars, Harvest Seasons and Production.

1. Julie is the only selected cultivar of commercial importance in Dominica. Others, including some of the Floridian mangoes, have been introduced, but, in spite of their good vegetative growth, flower production and fruit set have been very low. This may be due to ecological and nutritional factors. A wide range of seedling mangoes exists in Dominica. In fact, the bulk of production comes from this type of mango. Of these, the most important is the Kidney (Long) mango. In spite of the fact that this mango is stringy in texture and does not have the quality to be considered a table mango, it does have a limited regional demand.
2. The harvest season for mangoes in Dominica extends from May to November with the peak of production between July and August. This peak is mainly due to the wild mango season. There is a gap between December and April in which mangoes are seldom available. Early and late high quality cultivars should be introduced from other countries with similar ecological conditions to Dominica, for study of the performance at different geographical locations, with the view to filling this gap or part of it.
3. Present (1985) total mango production has been estimated at between 600 (EDD) and 1,904 (MOA) tonnes. This production is thought to come from a bearing acreage of 600 acres out of a total of approximately 1,000 established acres. Production by 1990 has been estimated to be 50% greater than the above figures. This production can be expanded, in quantity and, most important, in quality, if a programme to topwork the wild mangoes with selected cultivars is initiated.
4. About 60% of the avocados in Dominica are volunteer or planted seedlings of the West Indian race. Of these, only one clone ("Dominica") has been selected and is, at present, commercially propagated. Several selected cultivars have been introduced and tested in this island, the most important being: Pollock, Semil 34, Semil 31, Lula, Gripina 5 and Simmond.
5. The avocado season extends from July to March with a peak during the period August to November, mainly due to the local West Indian type avocados. While there is a present gap between January and June, late cultivars such as Lula, Semil 34, 43 and 31, Gripina 5, and others, are

available to cover the period January to March, when the planted and projected acreage enter into full production. Therefore, the period April to June is the one on which attention should be focused when selecting new cultivars and/or micro-areas for planting.

6. The total present production of avocados has been estimated at between 163 (BDD) and 4,909 (MOA) tonnes. * This production is derived from approximately 360 bearing acres of a total established acreage of 600 (242.8 ha). The production by 1990 has been estimated at 7,500 tonnes which is approximately a 50% increase over present production. As with mangoes, this production can be increased in quantity and improved in quality, if the wild local avocado seedlings are topworked with carefully selected high quality avocado cultivars.
7. Grapefruit is currently the most important tree-crop cultivated in Dominica. Among fruit, it is second only to bananas in foreign exchange earnings. Marsh seedless and Ruby Red are the most important cultivars but Thompson pink and Duncan are also available. While white cultivars, e.g. Marsh seedless, predominate in total acreage planted, new plantings are mainly of pink grapefruits (e.g. Ruby Red and Thompson Pink).
8. Grapefruits can be harvested as early as August in the Layou valley area and the harvest season extends through to March. The development of the capability to harvest earlier than August could enhance exports to the U.K. market. This goal might be achieved through a programme of careful study of the effects of different types and concentrations of growth regulators and other chemicals on the harvest seasons of existing commercial cultivars.
9. Present production of Grapefruit in Dominica has been estimated at between 5,200 (BDD) and 19,636 (MOA) tonnes. This tonnage is thought to come from approximately 2,100 bearing acres of a total established acreage of 2,700. The production by 1990 has been estimated as high as 29,455 tonnes. However, this projected production may be reduced by the fact that many plantings are being abandoned for the lack of markets. If the potential for pink grapefruit proves to be greater than that for white grapefruits, a programme of topworking should be initiated to change part of the grapefruit plantings from white to pink. The same can be said for oranges if a good market, e.g. Barbados, is opened.
10. Limes have had a long tradition as a commercial crop in Dominica, and are, at present, the citrus species of most importance in terms of acreage planted. The West Indian type is by far the most important while the Tahiti (Persian or Bears) lime has only recently been introduced. Large scale plantings of West Indian limes have been established, principally for the purpose of processing. No true clonal selection, on which a propagation plan could be based, has been made from the wide range of types found in Dominica. Limes are available from April through December.

* The big difference between the two estimates is due to the difference in the frame of reference used. Whereas BDD base their estimates on only production from introduced cultivars under the TCDP, the MOA includes the production from the wild cultivars.

The present production of Limes has been estimated at between 1,220 (BDD) and 12,443 (MOA) tonnes coming from approximately 3,500 acres (1,416 ha.) of which 58% are at bearing age. The production for 1990 is estimated at 18,655 tonnes by the more optimistic.

11. While several cultivars of sweet oranges are cultivated, Washington Navel and Valencia are the two most commercially important. W. Navel tends to be dry if cultivated in the warmer, low lands or if left on the tree beyond the normal time for harvesting.

This cultivar should not be planted at elevations of less than 200 m in order to obtain good quality fruit. In Dominica, W. Navel has a tendency to be alternate bearing. This factor may be reduced if proper management, e.g. a good fertilizer application programme, is implemented. The Valencia cultivar performs very well in Dominica. It is a prolific bearer and the excellent quality of its fruits permits it to be used as a double purpose orange (fresh and processing). Sweet oranges are harvested from September to March.

12. The present production of sweet oranges is estimated at between 580 (BDD) and 18,000 (MOA) tonnes, from a bearing acreage of 1320 acres out of an established acreage of 2,200 acres (890 ha.). Projected production for this crop has been made as high as 27,000 tonnes by 1990.
13. Other citrus species such as the hybrid Ortanique, can be found planted on a more limited scale. Present production of Ortanique has been estimated as high as 682 tonnes coming from 100 acres (40.5 ha.) of which 50% are considered to be at full bearing age. Estimates of production by 1990 reach as much as 1,090 tonnes.

Growing Areas and Conditions

14. Mangoes, especially from seedlings, are grown island-wide in Dominica. However, with the inception of the Tree Crop Diversification Project (TCDP), plantings have been concentrated in the drier coastal regions located below elevations of 300 m (984 ft) and including La Plaine, Woodford Hill, Colihaut, Roger Soufriere and Grand Bay. These areas are characterized by an annual rainfall of 75" to 100" (1,875 to 2,500 mm) and a distinct dry period during the months of February to May. In other areas, at higher altitude and rainfall, flowering, pollination and fruit set are reduced and the incidence of anthracnose is significantly higher.
15. Most avocados in Dominica are found in regions below 250 m (820 ft) in areas where the annual rainfall is less than 2,000 mm (80 inches). Above these levels of altitude and rainfall, the mortality of plants is greater as a direct result of the high incidence of foot rot disease (*Phytophthora cinnamomi*). Flower initiation and fruit set are also limited. Recently, under the TCDP, avocado planting has been concentrated in the same areas as already mentioned for mangoes.
16. Grapefruit and Sweet oranges in Dominica can be found island-wide, except for the coastal areas. These citrus plants are better adapted to the cooler, medium rainfall areas (2,500 and 3,750 mm/year) of shaded valleys. In the Layou valley area, Grapefruit tends to ripen earlier (mid August to September), thus facilitating access to the six week early window on the

U.K. market, during which the Dominican Grapefruits enjoy a period of reduced competition. To maximize this opportunity, all Grapefruits not harvested should be stripped from the tree to ensure an early crop in the following year.

In the wetter areas, Grapefruit is more susceptible to scab which reduces its market potential. Oranges also are more affected by pests and diseases in the wetter areas.

17. Although West Indian limes can be found growing in the medium rainfall areas of Dominica, they are better adapted to the drier coastal regions where the incidence of one of its more serious diseases (wither tip) is much less. However, Tahiti lime seems to perform well in regions with higher rainfall and elevation, for example Trafalgar, Laudat, Bellevue and others.
18. The Island of Dominica has ideal ecological conditions to produce good quality fruits of a relatively wide range of species including grapefruit, pummelos, orange, lime, some of the Citrus hybrids (Ortanique, tangelo, murcott, ponkan, etc.), avocado, passion fruit and sour sop. There also seems to be potential for other less traditional exotic crops such as carambola, guavas, mangosteen, pomegranate, sapodilla, pullasan, rambutan, langsat and durian, for which there is an expanding market in the USA and Europe. However, in order to compete in existing and potential markets, good quality fruits must be produced. This can only be achieved by carefully selecting appropriate cultivars, zoning and locating tree crops in the most suitable micro-climates and documenting their performance under these conditions, and strengthening the facilitating services to provide the best possible management.
19. From an ecological point of view, and, more specifically, due to high rainfall, Dominica has serious limitations for the production of good quality mangoes.

CHAPTER IV: PROPAGATION AND DISTRIBUTION OF PLANTING MATERIAL

1. The planning process for annual production targets by species and cultivars at the different nurseries needs to be revised and improved. Plant propagation should be a function of farmer demand, combined with governmental objectives towards the development of the fruit subsector and the expectation for internal and external demand of fruits. Under the present system, although planning is attempted, the feed-back from farmers and extensionists frequently arrives late and requests are overestimated.
2. While some nurseries have infrastructure in good condition, others lack even the minimum for proper operation. The irrigation systems are inadequate at most nurseries, resulting in higher than necessary labour costs. None of the nurseries have mist propagators or humidity beds, necessary components required for efficient propagation of plants by cuttings.
3. The cost of production of a budded bare-root citrus plant in 1980 was estimated at EC\$3.75. With the increase in costs of inputs and labour, this cost should now be at least 30% higher. Fruit plants, until recently, were highly subsidized, being sold to farmers at EC\$0.20. Recently the

price was increased to EC\$1.35 per plant for passion fruit and between EC\$2.75 and EC\$3.50 for tree crops, depending on the species. While this subsidy might be promoting the planting of fruit trees, the low cost of investment by farmers might be partially responsible for the lack of care provided to young transplanted trees. This subsidy should be revised and prices brought to such a level that the farmer will see the need to protect his investment.

4. Some of the propagation techniques currently in use are obsolete and limit the number of plants being propagated by the nurseries (e.g. for citrus). They may also lead to higher costs of production and, in some cases, facilitate contamination by pests and diseases. New techniques to upgrade the overall propagation process should be introduced.
5. The sterilization of the propagation tools and the potting media is one of the most essential practices to prevent contamination by soil borne and other disease organisms. It helps to prevent the spread of diseases in the nursery and from there to the farm. None of the nurseries in Dominica has facilities to sterilize potting media and no attempts are made to sterilize tools.
6. The staff at all nurseries are in need of training in nursery management, propagation techniques, maintenance practices, new products, pest and disease prevention and control methods and other activities necessary to upgrade the efficiency of the overall propagation process, and hence the quality of the final product.
7. Many new cultivars of fruits have been introduced into Dominica. They have been planted in museum plots but many were destroyed by the hurricane in 1979. The existing museum plots, especially those of citrus, are in very poor condition. In fact, rather than serving as a guaranteed source of clean, high quality planting material, they may represent a focus of infestation. Virus-free planting material has also been introduced and established in plots to be used as budwood sources. However, the current management and methods of collection of budwood facilitate contamination. The introduction of citrus planting material from sources other than Budwood Registration and Certification Programmes, exposes one to the possibility of having latent forms of citrus viruses which are spread worldwide (e.g. Exocortis, Psorosis and Xyloporosis). The fact that symptoms have not yet been found does not mean that Dominica is free of citrus virus. All citrus are currently propagated on sour orange (*Citrus aurantium*) stock which is resistant to the above named viruses. The need for a citrus virus identification programme for Dominica is justified due to the importance of this crop on this island. New museum plots are also a must, but, because of the relatively high cost of the establishment and maintenance of these plots, Dominica should give support to the other Windward Islands in a joint effort to establish a regional germplasm bank of fruit crops. The main responsibility of this bank could be the selection, introduction and maintenance of outstanding fruit species and cultivars for distribution of plant material to each of its members.
8. Although the nurseries produce and distribute a fair number of plants, the lack of technical controls may result in unnecessary production-related problems in the orchard. It is simpler and less costly to prevent the problems in the nursery than to try to correct them once the orchard is

established. It is necessary to define and enforce "Standards" for the production and release of plants by the nursery, in an effort to prevent many of these problems and ensure that farmers receive plants of high quality and in good condition.

CHAPTER V: CULTURAL PRACTICES

1. The practice of land preparation for the planting of fruit trees in Dominica is limited to the manual clearing of virgin or secondary forest, digging of the hole and the scraping of top soil from around the hole for refilling at the time of planting.
2. All citrus are bare-root transplanted, while mangoes and avocados are bagged. For young planted citrus the percentage of survival is as low as 60% in dry areas, while for bagged plants it is usually higher.
3. A very high level of intercropping of tree crops is practised in Dominica. On small holdings, trees are planted randomly between the main crop being grown at the time. Commonly, the farmer fails to properly consider the final size of the trees, resulting either in over crowding or plants too widely spaced.
4. Wind intensity may be a constraint to the production of high quality fruits, especially in the east coastal region (windward side) of Dominica. Due to extensive damage caused by hurricanes between 1979-81, very few of the established windbreaks remain and, since then, very little or no replanting has been undertaken. In this region windbreaks are very important since high wind intensity can reduce yields by causing defoliation, the abscission of flowers and young fruits, and the breakage of twigs and branches. It can also produce indirect damage (windscars) that affect the external quality of the fruit, minimizing market possibilities.
5. The low level of maintenance of tree crops in Dominica is the major contributing factor to plant death, low production and damage by pests and diseases. In Dominica, 25% of fruit farms are completely abandoned. The mortality rate for adult plants is over 5% per year. There are four major reasons for the poor maintenance of tree crops:
 - The difficulties in selling the produce.
 - The lack of inputs, mainly due to the poor economic condition of the farmers.
 - The steepness of the slopes and inaccessibility of some areas.
 - The low level of knowledge of fruit cultivation and the traditional concept that fruit trees do not need inputs.
6. The application of fertilizer to tree crops, when conducted, is haphazard. there is little differentiation of type, frequency or amount of fertilizer for the different species.
7. In spite of the large water resources of Dominica, all of fruit orchards are rainfed. This condition limits the planting of fruit trees to the rainy season. Water (lack or excess) is also one of the major factors responsible for the low survival of young transplanted trees.
8. Of all cultural practices, weed control is the most frequently practiced.

In scattered plantings, tree crops are generally ring weeded with a cutlass. In orchards, herbicides such as Paraquat are used. Most fruit trees planted on steep slopes receive very little care.

9. It has been estimated that 98% of fruit farmers do not spray their crops. This is a major reason for the production of fruits with external and internal damage which limit their market potential. Trees intercropped with bananas receive indirect benefits from the banana spray programme, especially with aerial spraying.
10. With the exception of some farmers within the TCDP, pruning is generally not practiced. This results in trees with low, tight (narrow) and multiple branches, increases the difficulty of carrying out other cultural practices, and contributes to the loss of fruits that, because of the heavy load, will make contact with the soil. On the other hand, since dead wood is not removed, the dieback becomes progressive, affecting other twigs and, eventually, the whole branch and the tree. Under these conditions, yield, as well as quality, is significantly reduced.
11. The technical assistance being provided to the fruit farmers is erratic and deficient. This is due to too few extension agents being available, with too many responsibilities thus limiting the possibility for their specialization and development of the capacity to resolve problems affecting fruit crops in the field. They also have very limited opportunities for systematic training.

CHAPTER VI: BIOLOGICAL AND PHYSICAL FACTORS AFFECTING FRUIT PRODUCTION AND MARKETING

Pests of Economic Importance

1. The mango seed weevil (*Sternochetus mangiferae*) was recently found in the southern part of the island. This pest feeds on the embryo within the seed of mango fruits. No effective control measures are available to date.
2. The citrus weevil (*Diaprepes* spp.) is a serious pest of citrus, particularly of young stocks in the nurseries. Widespread but less serious damage to leaves and roots of mature trees occurs. Control, both in the nursery and orchard, can be obtained by the use of soil insecticides. Experiments are currently in progress to determine the life cycle and optimum time for treatment.
3. Sucking insects (aphids, mealy bugs, scales) attack citrus, mangoes and avocados causing curling and distortion of leaves and the growth of sooty mould over the fruits, leaves, and branches. Heavy sooty mould growth can lead to reduction in fruit quality and quantity. Control measures include the application of systemic insecticides.
4. Mites attack citrus and avocado causing russetting of fruits and leaves. Control measures using acaricides are only necessary for serious infestation. Generally, natural control operates.

5. The banana borer (*Cosmopolites sordidus*) also attacks plantain, making tunnels in the corm, weakening it and leading to toppling of the plant. Control can be achieved by the application of soil insecticides in the planting hole and periodically thereafter to the mats.

Diseases of Economic Importance

6. Anthracnose (*Colletotrichum gloeosporioides*) attacks the twigs and fruits of mango and avocado causing spotting of fruits, spotting and distortion of leaves and die back of twigs and inflorescences. Although the disease is widespread and control measures available, they are not widely applied.
7. Foot rot (*Phytophthora cinnamomi*) of avocado, which starts as an infection of the collar region and leads to the decline and death of the tree, is of significance in the wetter areas and heavier soils. Control measures are mainly cultural due to the high cost of chemical control.
8. Scab (*Elsinoe fawcettii*) attacks the young leaves and fruits particularly of grapefruit resulting in significant economic loss on the fresh fruit market because of the unsightly warts and scabs on the skin of infected fruits. Control measures through the application of fungicides and field sanitation are available but seldom practiced because of the economic situation facing the citrus growers.
9. Melanose (*Diaporthe citri*) infects fruits causing discoloration and a roughening of the skin. Control is similar to that for scab.
10. Brown Rot (*Phytophthora* sp.) is a disease of maturing citrus, particularly grapefruits. It produces a large circular brown spot on the fruits which usually fall off prematurely. Control measures where and when required include good field sanitation and application of copper based fungicides.
11. There are several other pests and diseases which, individually, may be of little significance. However, when several occur together they can cause significant losses of certain crops, under certain conditions.
12. Understaffing of the Plant Protection and Quarantine section of the Ministry of Agriculture is another aspect of concern. This can lead to delays in appropriate action being taken to deal with crop protection and quarantine problems.

CHAPTER VII: FARMER ORGANIZATIONS IN DOMINICA

1. In July of 1986 some 60 farmers organizations were identified in Dominica. Some of these are considered vibrant, others functional, some functional but weak and a few are of only recent formation.
2. These 60 farmers' organizations can be subdivided into two groups. The first group includes the four commodity associations (Dominica Banana Growers Association, Dominica Banana Marketing Corporation, Co-operative Citrus Growers Association and the Dominica Essential Oils and Spice Co-operative Society) and the Dominica Farmers Union. The second group includes approximately 55 associations or co-operatives of small farmers distributed throughout the five agricultural districts.

3. In the case of the commodity associations, they have been active for many years (the DBGA since 1934, COGA since 1954, DEOSCS since 1972), are specialised in the commodities they deal with (bananas, citrus and bay oil) and tend to have large memberships (from 360 to over 5000).
4. The DEMC was only created in 1984 (due to financial/management problems within DBGA) and its membership is basically the same banana growers that form the DBGA.
5. In 1985, sales of bananas to the UK through the DEMC reached EC\$36 million; sales of bay oil through the DEOSCS reached EC\$855,360, and citrus (mainly grapefruit) through COGA amounted to EC\$226,110. Total sales through these three organizations was therefore EC\$37,081,470 representing 90% of the total value of agricultural exports and 52% of total exports from Dominica in 1985.
6. Whereas the commodity associations offer production information and some training to their respective memberships, the main service provided is that of product processing/marketing. The exception is the DEMC which supplies farm inputs, provides a training/extension service, offers air and ground spraying service and soil and leaf analysis, as well as information and marketing services to banana growers. The farm input supply service offered by COGA and DFU are relatively insignificant.
7. The basic service provided by both DBGA and DFU is that of lobbyist, functioning as the voice of their respective memberships in expressing opinions or grievances before government and other organizations.
8. The commodity organizations tend to be administered by 9-member boards of directors or executive committees wholly or partially elected by their respective members (groups) at annual meetings.
9. The DEMC maintains a permanent staff of 108 persons and 359 casual or day labourers. The permanent staff includes those working in extension as well as those in administration. The other commodity organizations only employ between 2 and 5 permanent staff. The COGA employs 125 seasonal workers for a six week period in August-September each year.
10. In respect to the 55 or so non-commodity farmers organizations in Dominica, their principal characteristics are as follows:
 - some 55% have been formed since 1980;
 - number of members per group is small, ranging from 3 to 95 with an average of 20;
 - many of the groups have been formed for a specific purpose, e.g. building a road, and will disband once their goal is reached;
 - group objectives vary from community development to specific goals such as increasing egg production or utilizing waste bananas;
 - the principal services offered by the associations are related to information, training and technical assistance, as few groups have resources to offer any permanent service;
 - most groups are made up of farmers; however, some groups have memberships interested in developing crafts or agro-processing;
 - the members of a particular group usually have similar interests and felt needs which are often crop specific.

- Priority is normally given to the production of ground provisions, vegetables, bananas, plantains and small animals.
- most groups view lack of markets and marketing abilities as major constraints;

11. The distribution of these organizations of small farmers by agricultural district is as follows:

<u>District</u>	<u>No Organizations</u>	<u>No. members</u>
Eastern	20	393
North Western	11	346
North East	13	185
Southern	8	123
Central	<u>3</u>	<u>31</u>
Total	55	1078

12. In an attempt to provide services which are not available locally, the MOA has helped form the Eastern District Extension Central Committee (EDECC) as a means to address specific farmer needs and to assist extension personnel in dealing with those needs on a group basis. The committee is made up of 14 members from villages representing some 300 to 400 farmers.
13. The EDECC has adopted a policy of farm production based on contractual arrangements to secure supplies and to ensure reliable markets.
14. A number of private sector initiatives are underway which are oriented towards the strengthening of organizations of small farmers and the overall improvement of production and marketing in Dominica. These initiatives are summarized below.

a) Small Projects Assistance Team Ltd. (SPAT)

The Small Projects Assistance Team (SPAT) was founded and registered in 1981. SPAT is a non-profit, non-government organization supporting and working with small farmers, agricultural workers, women and youth in rural Dominica. SPAT also assists organized community-based groups to conceptualize and implement projects in agriculture, craft, small industry and education. As part of SPAT's support programme, the base groups receive financial assistance, help in planning and proposal writing, training in production and management and development education. Its other activities include the funding of micro-projects, the promotion of appropriate technology and a resource/documentation centre.

b) Farm-To-Market Ltd. (FTM)

In 1982, SPAT and the DFU co-sponsored the FTM project and in 1983 the project was launched, commencing with an investigation into crop availability and regional market potential for fresh Dominican agricultural commodities. Trial shipments were made to Trinidad and Antigua and at the end of 1983, the project sponsors decided to commercialize the operations. In January 1984, the first commercial shipments were made to the Trinidad and Antigua markets. FTM became a registered company in October 1984 and in 1985 the organization finalized arrangements for the purchase of its own refrigerated ship.

The company has a Board of Directors consisting of eight (8) members, a Management Team of five (5) and employs eighteen (18) full-time workers. FTM has nine (9) centres of operation including its administrative office in Roseau, and services on a regular basis some 600 farmers. The company provides information (product requirements etc.) and training (product handling, quality control) to farmers. In 1985 FTM activities generated farm incomes of EC\$283,568. The company is mainly doing business in the USVI, St. Lucia and Antigua markets and has issued production contracts to farmers in a bid to guarantee supplies and secure its markets (regional and extra-regional).

c) Association for Caribbean Transformation Ltd. (ACT)

ACT is a regional organization of technical personnel with a commitment to support domestic food production and trade within the Caribbean Community. It is a non-profit company registered under the Company Act of Trinidad and Tobago, and having field offices in Antigua and Dominica. ACT's commitment to domestic food production has been strengthened over the last two years through the development of a comprehensive Agricultural Information System (AIS). The ACT-AIS provides data and information relating to agricultural and food production and trade in Trinidad and Tobago, Antigua and Dominica. The Organization has a Board of eight (8) members and employs seven full-time persons.

15. With respect to assistance to the farmers organization movement in Dominica from international/bilateral organizations, a large number of organizations can be identified. The COGA has received assistance from CDB and the Canadian Development Foundation. The DFU has been assisted with financial or technical assistance from Inter Pares, OXFAM and HIVOS. The DEMC received assistance from CDB, BDD, EDF, EEC, CIDA and USAID. The EDECC has been supported by CARDI, IICA, INRA and IRFA, these latter two through the French Technical Cooperation mission. The smaller farmers organizations have also received a variety of short-term assistance from a diversity of development oriented organizations. In all cases the assistance has tended to be problem specific and short-term.
16. In summary, while there is a large number of organizations involved and a diversity of things happening in this subsector, there is a distinct lack of an integrated and organized policy or strategy to strengthen production and marketing through farmer organizations in Dominica.

CHAPTER VIII: DOMESTIC MARKET FOR FRUITS

1. The population of Dominica in 1986 is less than 90,000 inhabitants distributed in some ten urban concentrations along the coastline and dozens of rural communities. The largest town, Roseau, contains less than 20% of the total population. Thus, potential domestic demand is limited.
2. The supermarket phenomenon, a sign of modernization, is only beginning to be seen in Dominica. Of the 19 larger grocery stores in the state, only four or five can be called supermarkets and all of them are found in Roseau. None of the grocery stores or supermarkets had chill facilities in July 1986 and no fresh vegetables or fruit requiring cooling were sold. When cold storage is required for imported items, refrigerated containers

are rented. Insignificant quantities of selected fruits may be retailed from time to time.

3. Small shops which retail a wide range of food and non-food items, in both urban and rural residential areas, sell small amounts of popular perishables having relatively long shelf lives, e.g. ground provisions, plantains, etc. From time to time in-season fruits will be retailed in those shops located in more urban areas.
4. Dominica does not have a strong tourist economy. There are fewer than 20 hotel/guest houses with a total of less than 400 beds. Cruise ship calls have been less than 20 per annum in recent years. Restaurants are as scarce as hotels.
5. Given the situation described above, the conclusion can be reached that the domestic demand for fresh fruits (as well as most other agricultural produce) is very small and that which is retailed moves predominantly through the public markets, of which there are four with basic infrastructure (Roseau, Mahaut, Portsmouth and Calibishie).
6. The principal public market is that of Roseau whose relatively new infrastructure was built after the devastating hurricanes of 1979 and 1980. It is constructed of reinforced concrete, well ventilated, has good natural lighting and amenities including toilets, offices and chill rooms (not in operation).
7. A small group of vendors (20-40) retail inside the market six days a week. On Fridays and Saturdays a large number of farmers (100-300), varying with the season, converge on the marketplace where they retail their produce, spread before them on used plastic bags. No statistics are available as to the quantities of produce moving through these markets. Consumers tend to emphasize price over quality.
8. The newly formed Dominica Export Import Agency (DEXIA), which has taken over from the defunct Dominica Marketing Board, neither buys nor sells fresh produce and thus offers no domestic market for these items.

CHAPTER IX: AGRO-PROCESSING IN DOMINICA

1. There is a large number (50-100) of small home and cottage industries processing small volumes of fruit and some other fresh produce in Dominica. Most of these micro-enterprises specialize in one or two products which are marketed domestically. Most, if not all, of these firms process less than one tonne of raw material per annum.
2. There are five industrial scale operations in Dominica. Three (Dominica Coconut, Corona Development and Dominica Food Industries) specialize in only one product (coconut, passion fruit and sorrel, respectively) whereas the other two (Dominica Agro Industries and P.W. Bellot & Co.) process between four and nine types of raw materials, mainly fruit. Total quantity of raw materials (excluding coconuts) processed annually by these five firms is approximately 4,500 tonnes.

3. The fruits processed in largest volumes in order of importance are grapefruit (app. 3,000 tonnes), limes (1,500 tonnes), coconuts, passion fruit (400 tonnes planned for 1986), pawpaw (<50 tonnes), guava (<20 tonnes) and small amounts of a number of others.
4. With respect to basic services, the main road system between towns is good, water is of high quality and in abundant supply, telephone/telex services are available at those points where processing takes place and both single and three-phase electricity is available, although there may be a long waiting period for new plants located outside of city limits.
5. Physical facilities are considered good for those operations of industrial scale although storage space is limited for packaging materials and finished products. In the case of cottage and home industries, due to the nature of the firms - their smallness and lack of capital - the facilities are often cramped and the factory layout poor.
6. Obtaining proper equipment and replacement parts on a timely basis and at affordable prices is a continuous problem for both the large and small-scale operations.
7. In terms of employment, the impact of micro-agro-processing firms should not be taken lightly. Whereas the five industrial scale operations employ over 200 persons at their peak of operations, this will drop to around one-third of that number in the off-season. Although the cottage industries only employ between two and ten persons per firm and the home industries only two or three persons per firm, the total number of jobs created may exceed that of the large scale industries.
8. One of the functions of the AID Bank and the National Development Foundation of Dominica is to promote the development of agro-industries. Although financing is available, it is often difficult for new firms, particularly the home and cottage industries, to meet loan requirements.
9. Supply of raw materials is normally not a serious constraint for the small operator. His needs can often be met by one farmer or one visit to the public market.
10. Acquisition of raw materials for industrial scale operations is more complex. One of the oldest firms (P.W. Bellot) has resolved the problem by diversification, i.e. processing smaller amounts (4 to 100 tonnes) of a wide variety of products and marketing domestically.
11. Another firm, Dominica Coconut Products, is almost the sole purchaser of coconuts on the island. This firm not only has little competition but benefits from the government's Coconut Rehabilitation and Expansion project.
12. New agro-processing firms tend to find that present supplies of fruits are insufficient to meet their needs. They are therefore forced to promote production on their own or with government support and/or compete with other firms in the purchase of supplies available on the local market. In this latter case, agro-processing firms are at a disadvantage when competing for fresh produce with firms engaged in fresh fruit exports.

13. Packaging material is a major constraint in the local fruit processing industry. Appropriate packaging material is normally imported. Input costs tend to be high, materials are sometimes unavailable and considerable capital must be tied up in inventories. Small agro-processors try to cut costs by recycling containers, resulting in a low quality appearance of their products and increased difficulties in marketing.
14. Although fruit processing technology is available, there exists a problem in the transfer of these technologies to the users, particularly small scale operators. While the larger firms often employ university graduates and other staff with technical qualifications, small scale operators depend upon whatever subsidized services are available from government, through Produce Chemist Laboratories or donor agencies.

CHAPTER X: TRADE IN FRESH PRODUCE

1. Total imports in 1985 were EC\$149.3 million of which 19% (EC\$28.8 million) were food and live animal imports. Of this latter category, only about one percent (EC\$318,286) represented imports of fruits/fruit products.
2. Of the EC\$318,286 of total fruit imports, 17% was dried fruits, 15% fruit juices, 4% jellies/jams/preserves and 64% other fruits and nuts. Given this structure and the relatively low value of overall fruit imports, the potential for import substitution is low.
3. Fresh produce exports (excluding UK bananas) reached 8,015 tonnes in 1975, of these, 91% were fresh fruits, 7% ground provision and 2% vegetables.
4. After dropping to a low of 2,688 tonnes in 1980, fresh produce exports (excluding UK bananas) began to recover and reached a high of 5,746 tonnes in 1984 and 5,562 tonnes in 1985. Of the 1985 figure, 88% were fruits, 9% ground provisions and 3% vegetables.
5. Of the 4,896 tonnes of fruit exported in 1985 (excluding U.K. bananas), 599 tonnes (12%) went to the U.K. and the balance of 4,297 tonnes (88%) went to regional destinations as follows: Guadeloupe, St. Martin, Martinique, 53%; Netherland Antilles 10%; Trinidad 6%; USVI 2% and others 2%.
6. With respect to type of fruit exports in 1985, grapefruit represented 49%, oranges 13%, plantains 13%, limes 5%, mangoes 4%, avocados 1% and miscellaneous others 15%.
7. As the Dominica Agricultural Marketing Board ceased operations in 1984, the 1985 fresh produce exports were channeled through only two types of firms: commercial exporters and the traditional hucksters. In the first case there are only three firms in operation; these are Farm to Market Ltd, Joseph Exotics and Caribbean Commodity Exchange. In the second case, between 350 and 400 hucksters are thought to actively participate in regional trade.
8. Of the 5,562 tonnes of non-Uk banana fresh produce exported in 1985, 79% of the total was exported by hucksters, 21% by farmers organizations (including FTM) and less than one percent by other exporters.

9. The Dominica Hucksters Association (DHA) was formally launched and registered in July 1982 in an effort to give a formal structure to the affairs of Hucksters. The DHA is an island-wide organization with a membership of 330 persons and employs an executive and an administrative secretary. The Association has a 13 member Board. From its Administrative office in Roseau, members can obtain information on phytosanitary regulations, visa requirements, quality standards, packaging, shipping etc. Apart from providing training for its members and potential hucksters, the DHA puts its members in touch with contact-farmers around the country and actively engages in export promotion.
10. Farm to Market Ltd. offers a new and innovative concept to marketing of perishable produce. It is not a typical commercial enterprise and, in fact, was established as a joint effort to assist small farmers in the market of their produce. Services provided include market intelligence, training of farmers and extensionists in post harvest handling, production contracts, brokerage for credit and inputs and inter-island transportaiton on its privately owned, refrigerated vessel. In 1985, FTM exported nearly 600 tonnes of perishable produce.
11. With very limited international airport facilities and infrequent flights, nearly all of the fresh produce exports are made by sea. Only 600 tonnes of non banana fresh produce was shipped to the U.K. on Geest in 1985 and another 600 tonnes was shipped intra-regionally on the FTM vessel. The remaining 4,362 tonnes of produce, therefore, can be assumed to have been shipped intra-regionally by hucksters on the traditional inter-island schooners.

CHAPTER XI: INSTITUTIONAL ANALYSIS

1. The Agricultural Industrial and Development Bank (AID Bank) is the major institution (assets EC\$20.5 million) disseminating credit for agriculture and does so through four major programmes, with interest rates between 5.5% and 12%, depending on the scheme. Sources of funds are CDB and IFAD. At June 30, 1985, total loans outstanding in the agricultural sector amounted to EC\$4.5 million, representing 42% of the outstanding total loan portfolio.
2. The AID Bank has, throughout the years, made loans for activities that impact directly and indirectly upon fruit production and marketing. A sizeable proportion of the Bank's portfolio represents loans for establishment and maintenance of fruit tree crops, notably citrus, avocados and mangoes. The Bank also grants loans for vehicles which facilitate the production and marketing of fruit crops.
3. Jointly with the Co-operative Citrus Growers Association, the Bank operates a scheme directed to grapefruit growers to enable them to obtain small loans for fertilizers, insecticides, sprayers and field crates. An inventory of up to EC\$360,000 of such inputs was procured by the Bank and made available to grapefruit growers by way of loans and cash.
4. During the last three years, the Bank has made direct loans (EC\$932,000) for five major projects which should also impact positively on fruit production and marketing in a significant way. Two of these are small

aircraft which transport large quantities of farm produce, much of which consists of fruits, on a regular basis from Dominica to the United States Virgin Islands. A large vessel which will carry agricultural products to Barbados, and possibly Trinidad, is now under construction with AID Bank funds. The other two projects are agro-processing concerns: Dominica Food Industries (DFI) and Corona Development Ltd. (CDL).

5. Four commercial banks operate in Dominica. They tend to be over-cautious about funding agriculture and undertake this to a very limited extent. Interest rates range from 10 to 14% per annum and terms do not normally exceed five years. Also, commercial banks do not generally grant moratorium on loans.
6. Credit Unions play a significant role in providing credit at both town and village levels. There are twenty-two autonomous branches island-wide, affiliated at the secondary level to the Dominica Co-operative Credit Union League. The league provides educational and business advisory services to develop a higher standard of management and operation in the movement. Dominica's Credit Union Movement, established in 1957, is the largest in the Eastern Caribbean and fourth in the region. The movement also is said to have been one of the world's most dynamic in recent years, enjoying rapid membership and asset growth. At end 1985, membership stood at 36,457 (43% of the population) with a combined share capital of EC\$23 million. Loans outstanding then were EC\$28.8 million. Loans are at 12% per annum reducing balance, for "productive or provident purposes". Loans for "business," including agriculture and fishing, accounted for no more than 6.5% over 1982-84. Security for loans range from guarantee of a co-maker, to land title.
7. Using grant funds, the Dominica Hucksters Association operates a revolving loan fund administered by the AID Bank. Loans are made only to bona fide hucksters who have been members of the Association for at least six months, and are limited to EC\$1,000 payable in 60 days at 8% interest, and guaranteed by a fellow huckster. In 1985, 75 loans for EC\$74,050 were granted.
8. The National Development Foundation of Dominica (NDFD), established in August 1981, grants loans and provides technical assistance to "viable projects which can be considered productive". Emphasis is placed on funding industrial and manufacturing projects, including agro-processing and timber-related enterprises. No loans are made to agriculture, since NDFD has decided that existing facilities at the AID Bank presently adequately cater for funding requirements of small enterprises in the agricultural sector. NDFD does not wish to spread its limited resources into agricultural projects. In 1985, 68 loans totaling EC\$222,419 were made.
9. Over the years, farmers have been unable to dispose of most of their fruit crops. Their demand for credit for establishment and upkeep of fruit crops is therefore low, although expansion continues where Government subsidies apply. The operations by the AID Bank of the Inputs Supply Scheme for the grapefruit industry, aimed at increasing overall production of marketable grapefruits, has demonstrated a low level of willingness on the part of farmers to borrow for grapefruits in view of persistent poor sales results.

10. In the area of agro-processing there is a need for new ideas and further development. Identification of processing options and needs for equipment, technical assistance and markets by a competent institution and dissemination of same to interested parties is thought to be one way of bringing about increased activity in this sub-sector. Loans could be made for agro-processing endeavours as a way to increase marketing alternatives for fruit crops.
11. The legislation to create the Dominica Export/Import Agency (DEXIA) was passed in the House of Assembly on May 26, 1986. This new entity represents the merger of the External Trade Bureau, which had been importing rice and sugar, and the Dominica Agricultural Marketing Board, one of whose main functions was the export of fresh fruit and vegetables.
12. As to its organizational structure, DEXIA will consist of two departments: the Market Services Support Department (MSSD) and the Commercial Department (CD). The MSSD will include in its activities the maintenance of a documentation centre, provision of market intelligence, training activities in marketing, liaison with institutions within and without Dominica to obtain specialised marketing expertise, assistance to exporters in their marketing problems, organisation of trade fairs and backward linkage to growers. The Commercial Department will continue with the import of rice and sugar, presently handled by the Export Trade Bureau. On the export side, no decisions have been made as yet on whether DEXIA will engage in direct marketing activities.
13. The Ministry of Agriculture is made up of three divisions: Agriculture, Forestry and Fisheries. The division of Agriculture contains some 90% of the MOA technical staff and is the driving force behind Dominica's development efforts in the agricultural sector.
14. The Division of Agriculture (DOA), in July 1986, had 59 official technical positions; however, it employed 75 persons. This was possible by hiring people at lower levels on a daily paid basis. These 75 persons included 9 agricultural officers, 11 agricultural assistants, 19 agricultural instructors, 9 lab technicians/trainees/foremen and 27 daily paid persons. At the highest level (AO), 31% of the positions were unfilled. Five units (research, plant protection/quarantine, land use, statistics and information) had no one at the AO level.
15. In addition to these 75 technicians, there are 12 professionals from the DOA, at the AO and AA level, who have been seconded to other institutions (AID Bank and DEMC) and special projects (tree crops, orchard pest management, coffee, DEXIA, lime rehabilitation, essential oils/spices, integrated rural development).
16. The DOA is under serious financial constraints and the government of Dominica/IMF agreement does not allow the creation of new staff positions. As a result, economic incentives for staff within MOA are very limited.
17. The above situation leads to a weakening of the Division of Agriculture as summarized below:
 - Under-staffing at the higher grade officer levels and no staff in some units.

- Available manpower is concentrated in the most essential units, e.g. livestock and extension, at the expense of other units.
 - Increase in the number of lower level daily paid workers, in an attempt to get the work done (sacrifice of quality for quantity).
 - Blockage of positions by those on secondment and the inability to create new posts affects the motivation of those seeking advancement.
 - The MOA is in the process of suffering a brain drain as staff transfer to other institutions and special projects.
18. The AO and AA level staff seem to be well trained. All AO's are trained to degree level and three-fourths of the AA's are trained to diploma level. However, there is a need for specialized training to keep these technicians up-to-date in their fields as well as a more generalized training for technicians at the AI level who possess varying numbers (1 to 5) of GCE level passes.
19. The DOA continues to perform surprisingly well under the circumstances, the reasons for this relatively high performance being:
- The camaraderie of all members of the staff,
 - The commitment of the staff to the farmers, and
 - The encouragement given to the lower staff by senior officers.
20. As long as morale stays high, the DOA is likely to continue producing results. However, as more AO's are seconded and without economic motivation, morale is likely to decline and services to the farmers could well come to a standstill.
21. The institutional framework of the DOA is satisfactory. What is required is the creation of posts necessary for filling the positions on the ground, the provision of training to upgrade the staff making them eligible for higher diploma and degree courses, and provision of scholarships for these courses.
22. At the present time, some 13 special projects are being executed in Dominica with donor support. Of these, eight are directly related to tree crop production/marketing. The titles of these special projects follow:

<u>Title</u>	<u>Donor</u>
- Tree Crop Diversification Project	BDD
- Tropical Tree Crops and Spices	BDD
- Orchard Pest Management	BDD
- Banana Industry Support Fund	BDD
- Coffee Development Project	BDD
- Agricultural Export Marketing	BDD
- Coconut Rehabilitation & Expansion	CIDA
- Lime Rehabilitation	EDF
- Essential Oils Programme (and Spices)	EDF
- Floriculture Development Project	EDF
- Integrated Rural Development	OAS, IFAD
- Agriculture Training Centre	FAC (French)
- Integrated Research & Micro Project	FAC (French)

Projects in Pipe Line

- Improvement in Information
- Development of National Parks
- Video Unit Equipmentation
- Livestock Training Dev. Centre
- Preparation of Forest Inventory
- Environmental Education Newsletter
- Development of Environmental Clubs

Proposed Donor

ACCT-France
CIDA
FAO
FAO
FAO
UNESCO
UNESCO

APPENDIX 2

CONCLUSIONS GRENADA



CONCLUSIONS GRENADA

The following conclusions have been summarized from the country report on Grenada. prepared by IICA during the period January - July 1986 and published as a separate document.

In the preparation of the original country report the following persons made valuable contributions with information and/or special reports.

<u>Name</u>	<u>Subject Area</u>
Winston Bain	Agricultural credit
Terrence Beddoe	Crop characteristics
Reynold Benjamin	Farmer characteristics
Raphael Braithwait	Internal marketing
Neville Burris	Plant propagation
Cyril Dominique	Pests and diseases
Bruce Johnson	Natural resource characteristics
Michael Kirton	Farmer organizations
Michael Mason	Land use
Peter Radix	Agro-processing
Robert Reed	Export marketing
Lydia Simmon	Co-operatives

The writing of the final country report was carried out by IICA specialists: Cosmos Joseph, agronomist IICA Office in Grenada; Jerry La Gra, marketing specialist and study coordinator, IICA Office in St. Lucia; Rafael Marte, fruit production specialist, IICA Office in Barbados.

CONCLUSIONS GRENADA

CHAPTER I: NATURAL RESOURCE BASE

1. Grenada is furthest south of the Windward Islands and has an area of 120 sq. miles (311 sq. km.). An additional 13 sq. miles is added with the inclusion of the two sister isles of Carriacou and Petit Martinique.
2. Grenada has a tropical marine climate. The mean annual mean temperature is 25 degrees C (77 degrees F), ranging from 16 degrees C (61F) to 32 degrees C (90 F). Relative humidity averages 75-80%.
3. The amount of rainfall varies almost directly with elevation. While rainfall in coastal areas in the extreme East, North and South does not exceed 50 inches (1,270 mm) per annum, in the mountainous interior (above 2,500 ft/758 m) annual rainfall can exceed 160 inches (4,065 mm). At lower elevations, below 500 ft (150 m), annual rainfall ranges between 50 and 100 inches (1,270 mm and 2,540 mm).
4. According to Koppen's Climatic Classification, there are three climatic regions in Grenada:
 - Wet equatorial climate
 - Tropical wet to dry climate
 - Hot steppe climate

Based on this and other classifications of Grenada's climate, approximately 80% of the land area is suitable for growing tree crops with no moisture limitations at all or some water stress during the dry season, which can last from three to four months during the period January-June.

5. Grenada is located south of the main hurricane paths and in modern times has experienced only one major hurricane viz. Janet in 1955. However, severe wind and rainstorms in 1963 and 1975 caused extensive damage to the island's tree crops. In general, tropical storms are recurrent events in Grenada and preventive measures (windbreaks and soil conservation practices) can mitigate the destructive potential of these storms.
6. Grenada's topography is extremely irregular, having steep, high-relief hills and narrow valleys in the center, low-relief, gently-sloping hills in the east, deeply embayed coastline in the south and steep valleys and sea cliffs in the west. The 120 sq. miles of island is divided into 71 distinct catchment basins offering a diversity of micro-climates.
7. Fully 71% of Grenada's land surface has a slope of 20% or more and 20% has a slope of over 30%. Virtually all of the flat land is confined to the lower reaches of the river valleys.
8. According to Vernon's 1959 land capability study, 50% of Grenada's 73,475 acres are only suited for tree crops or natural vegetation while an additional 24% is only suitable for natural forest. The remaining 26% falls into land capability classes I to III and can be cultivated although under strong limitations for the most part.

9. The Grenada government currently owns 24 estates with a total area of 3,201 acres, of which 1,764 acres are cultivable. These estates are located throughout the island and have wide variations in altitude, physiography, climate, soils, access, distance from market, etc.
10. Management of these estates is the responsibility of the recently formed Grenada Model Farms Corporation (GMFC) which has taken the estates over from the recently dissolved Grenada Farms Corporation. Responsibilities of GMFC include:
 - Administration of model farms project, including the financial and legal aspects of land divestiture;
 - Inventory of land resources;
 - Preparation of feasibility studies;
 - Development of lands prior to settlement; and
 - Provision of some post-settlement technical assistance.
11. While some ambiguity remains about certain details of the project, it is envisioned that private farmers will settle on farms of about five acres each. The farmers will occupy the land according to terms of a lease/purchase contract. GMFC will supervise farmers in order to provide services and to ensure a high standard of agricultural productivity. Funding for the project is expected to come from USAID and other agencies. Eventually, the GMFC will be dissolved when the farmers have fulfilled the terms of the lease/purchase contract and the land becomes their legal property.
12. The largest government holdings are the lands of Grenada's interior, namely the Grand Etang Reserve and the Mt. St. Catherine area. These tracts are located in Grenada's most rugged terrain and experience the highest amounts of rainfall (140 to 160+ inches/year). These areas are the main water catchment areas for Grenada's population centres. Due to their importance as catchments and the risk of eroding thin hillside soils, these areas are reserved for forests. The Grenada government would like to establish a system of National Parks and protected watershed areas so as to preserve these areas for the benefit of Grenadians and tourists alike.
13. Government is now preparing a comprehensive Land-Use Policy which will set forth guidelines for wise use of the nation's resources. This policy should be made public in 1987.
14. With 71% of Grenada's land having 20 degrees slope or greater, slope becomes a serious constraint. Not only is it more expensive to control erosion but production and transportation costs are increased considerably. Banana blowdowns are more frequent and road construction is more expensive.
15. Local variations in soil fertility, drainage, depth and stoniness can present problems which affect land capability of a specific area. At present, the Mirabeau Soil Lab is sampling soils as part of an effort to select areas for fertilizer trials, as well as to build up a data base.

16. A general lack of land titling and registration makes it difficult for planners to tabulate accurate acreages, road access and water availability, and for farmers to obtain loans secured by their lands.

CHAPTER II: SOCIO-ECONOMIC CHARACTERISTICS OF THE GRENADIAN FARMER

1. Decades of experience under difficult conditions, steep topography and limited resources have bred a Grenadian farmer who believes in spreading his risks. This is best demonstrated by his complex system of multi-cropping, complemented by small animal production.
2. The practice of passing land from generation to generation has led to large-scale fragmentation of farm-lands and a large number of uneconomic size units. The average size of farm holdings in 1981 (most recent agriculture census) was 4.2 acres and some 68% of the farms were two acres or less in area. Many farms are made up of several parcels (often 3 to 5), often separated by considerable distances and located in distinctly different ecological zones.
3. Of the 8,202 farmers identified in the 1981 agricultural census, 49% are full time farmers. The remaining 51% seek non-farm employment or work as labourers on other farms.
4. Of the 8,202 farms enumerated in the 1981 census, 34-38% were directed by women (in Carriacou 59% were directed by women as the male population concentrates more on fishing).
5. The total agricultural labour force was stated as 12,382 persons in 1981 representing about one-third of the working population. The average age of farmers was 51 in 1981, ranging from 47 for part-time farmers to 56 for full-time farmers.
6. Of the total number of agricultural workers, 25% were women. Regional marketing of agricultural produce is almost exclusively in the hands of women known as "traffickers".
7. Land tenure, farm size, farm location, type of crops cultivated, and the financial capability of the farmer to employ hired labour are among the main factors which tend to categorise the Grenadian farmer.
8. In general, commercial farms are those run by full-time farmers owning more than 10 acres of land at higher elevations (over 250 m) and growing traditional export crops (nutmeg, bananas), using a high degree of technology and hired labour. Their marketing problems are resolved by the commodity associations to which they belong.
9. Those part-time farmers who normally own less than 10 acres of land and earn most of their income from non-farm employment can be considered semi-commercial farmers. Their farms are usually at intermediate elevations (100-250m) and the major crops grown are nutmeg, banana, cocoa, citrus, avocados and root crops. They often employ a farm supervisor and marketing of the traditional crops is handled through the commodity associations.

10. A third category of farmer in Grenada is struggling for economic survival. His farm is very small (0.5-2 acres) and located in the dryer low-lands. He has very little education and little access to services such as credit, information and technical assistance. He has a backyard orchard with a few low productive banana, coconut, cocoa, breadfruit, mango, citrus and sour sop trees. Where space allows, he grows food crops for family use. He minimizes his input costs and sells his produce in the public market or to itinerant buyers. He maintains some small animals and works as a day labourer on a neighbouring commercial or semi-commercial farm.

CHAPTER III: CROP CHARACTERISTICS AND GROWING CONDITIONS

Crop Characteristics

1. Julie is the most popular selected Mango in Grenada. Other selected cultivars being propagated and cultivated include Graham, Ceylon, Peach and Imperial. A wide range of seedling mangoes exists but these have little market potential. These might be topworked using selected cultivars, with regional and extraregional demand, to increase the production of good quality mangoes in a relatively short period of time.
2. Julie fruits tend to ripen too rapidly, thus limiting their shipping quality. Graham, Peach and Imperial are prone to anthracnose attack and, therefore, require a more intensive spray programme and proper locations for new plantings.
3. Harvest season for mangoes in Grenada extends from April to October with a peak in early July to mid August. A gap exists between November and March in which mangoes are seldom available. Early and late cultivars should be screened and introduced with a view to filling this gap.
4. While several selected avocado cultivars including Pollock, Simmonds, Lula, Hall, Booth and Choquette have been introduced, most avocados in Grenada are seedlings from the West Indian Race. However, some local selections exist. Farmers give preference to the local avocados mainly because of a lack of promotion of the introduced cultivars. This situation contributes to increasing the seasonal glut of avocados since early and late cultivars, although available, are not being planted.
5. The avocado season extends from June to January with a peak in August and September. There is a gap between February and May when avocados are seldom seen in the market. Further selection of local clones and introduction of early and late cultivars should be oriented to fill this gap.
6. Of the Citrus spp., sweet orange and grapefruits are commercially the most important in Grenada. Washington Navel, Parson Brown, Pineapple and Valencia are the main sweet orange cultivars, while Marsh seedless and Duncan are the main grapefruit cultivars.
7. Duncan produces fruit which is somewhat objectionable for the fresh fruit market because of its seedy nature. Marsh seedless is well accepted, matures later in the season (January to mid February), does well in rainfall up to 90" per annum and is a prolific high yielder.

8. Sour sop is found growing throughout Grenada as scattered seedlings. Although some local selections are available no commercial planting exists.
9. Reliable data about production and acreages of fruit crops in Grenada are not available.
10. There are no commercial fruit tree orchards established in Grenada. The existing trees are in scattered plantings within the traditional crops of nutmeg, cocoa and bananas.

Growing Areas and Conditions

11. Grenada's ecological conditions are suitable for the cultivation of a very wide range of fruit species. The rainfall variation from the dry coastal periphery to the wet interior ranges from a low of 1,300 mm to a high of more than 4,000 mm per annum. Fruit crops such as mango, sour sop, sapodilla and sugar apple perform well in the coastal areas which normally experience four to six dry months. Citrus and avocado flourish in the mid-elevation areas (100-250 m altitude) where there are three dry months and rainfall of 2,000 - 2,500 mm per annum.
12. Based on soil characteristics, more than 80% of Grenada's soil is ideally suited for fruit tree crop cultivation. However, the very steep and irregular slopes in some areas precludes such cultivation.
13. Aerial photographs taken in 1982 indicated that of the 18,834 hectares of Grenada's agricultural lands only 935 hectares (approximately 5%) were cultivated in fruit trees.
14. Grenada is divided into five agricultural districts: North, South, East, West and Carriacou. The major fruit producing areas are in the eastern agricultural district. However, the western district is outstanding for the growing of grapefruit, orange, and mango. This district has very few sour sop and avocado growing areas. Lime is the only fruit tree crop of significance in Carriacou. Significant proportions of the soursop and avocado growing areas are found in the southern district.
15. High fruit yields are obtained in all major growing areas, but fruit quality is a major problem - especially in the case of mango.
16. The Island of Grenada has ideal ecological regions to produce good quality fruits of a relatively wide range of species, including mangoes, oranges, limes, citrus hybrids (ortaniques, tangelos, murcott, etc.), avocados, passion fruit, breadfruit and sour sop. There is also potential for other exotic fruits such as carambola, pomegranate and Asean fruits (mangosteen, pullasan, rambutan, langsat and durian).

CHAPTER IV: PROPAGATION AND DISTRIBUTION OF PLANTING MATERIAL

1. Many fruit plants in the Mirabeau nursery are repotted or dumped, each year, while there is a deficit in the propagation of others. This increases costs of operation unnecessarily so. The main causes of this

situation are a lack of coordination between the farmers, the extension officers and the person in charge of the nursery and the present system for distribution of plants.

2. The fact that Mirabeau is the only nursery in Grenada supplying fruit plants makes it difficult to stimulate interest among farmers located in areas relatively far from this location. One solution would be the creation of satellite distribution nurseries in production areas, which would receive plants prepared at Mirabeau. The MOA is presently considering the implementation of this proposal. Another alternative is to provide free transportation services to farmers in priority areas with recognized potential for fruit production. This solution is being applied in the case of cocoa plants.
3. The total percentage of take for budding or grafting citrus, mangoes and avocados can be considered low (40%-80%, 60%-80% and 40%-70% respectively). The lower percentages are obtained during the rainy season when the material for budwood is too young or too old for traditional methods of propagation. These percentages can be significantly improved by introducing propagation methods presently unused at the Mirabeau nursery. The nursery personnel should be trained continuously in new methods and practices to improve the efficiency of this nursery.
4. Rather than guarantee the cleanness (freedom from pests and diseases) of plants sold to farmers, the nursery at Mirabeau may be contributing to the dissemination of major problems. Many practices in use at the nursery are facilitating contamination by pathogens of the plants being propagated. Some of these problems are not noticeable during the life of the plant in the nursery, but show up later in the field. Specific examples of these malpractices are the following:
 - The soil media or potting mixture is not sterilized, thus there is a possibility of contamination of the plant or seeds potted.
 - The nursery buys seeds of avocados for use as rootstocks. This practice is known to be the most common way to introduce Foot rot into the nursery and from there, to the farms.
 - The sterilization method used for avocado seeds at the nursery is not very effective against *Phytophthora cinamomi*, causal agent of the Foot rot disease of avocados.
 - The possibility that tristeza and other citrus viruses might be present in Grenada has been suggested; in spite of this, the methods used to collect budwood, rather than preventing, may lead to contamination. Propagation tools are never sterilized and there is no virus-free plot established. Also, most of the citrus plants are still propagated on Sour orange rootstock which is highly susceptible to Citrus Tristeza Virus. The only other stock being used is the Rangpur lime which is used on a very limited scale.

5. The following actions are suggested for dealing with the above-mentioned problems:
 - A citrus virus indexing programme should be started to identify the virus and virus-like problems (if) present.
 - A citrus virus free plot should be established and used as the only source of citrus budwood.
 - New rootstocks for citrus should be introduced and tested in the different growing areas of Grenada. The performance of the combination stock/scion should be studied.
 - The nursery personnel should be trained in practices of sterilization, both for plant material and tools, and of disease prevention. Sterilization facilities should be established and new sterilization methods introduced.
6. The nursery is giving too much emphasis to the propagation of local clones of avocados (70% of the target for this species). The main reasons for this are the ready availability of budwood and the demand of farmers. These farmers, being more familiar with the local clones, give them priority over the imported ones. The constraint is that most of these cultivars mature at the same time, when there is already a glut of fruit on the market. The planning of the nursery production, in terms of species and number of plants per cultivar to propagate, should not be done only on the basis of farmer demand. More important is government's developmental policy and the potential for extending the production seasons. Therefore, late and early bearing cultivars, imported or local, should be selected and given preference in the propagation plan. The promotion of these cultivars will become easier once farmers become aware of the economic advantages of producing good quality and out-of-season fruits.
7. The museum of cultivars is in poor condition. This leads to a significant shortage of clean plant material for propagation. The situation is particularly critical in the case of avocados where most of the plants are in an advanced state of decline because of Foot Rot (*Phytophthora cinamomni*). New museums are urgently needed. They should be established taking extreme care in selecting the place and the trees to be planted. Meanwhile, some plants could be potted in large containers to be used immediately as sources of budwood. However, due to the limitation of the number of scions in young plants like these, avocado plants should be propagated by Chip budding rather than by grafting. When the plants at the new museum are ready, the wedge method could be used again.
8. Due to pressure from farmers, the nursery has been releasing plants, particularly citrus, at very young ages. A high percentage of these plants die soon after planting because they require special attention which the farmers either cannot or do not provide because they are unaware of what needs to be done. The ones that do survive will have to be pruned to eliminate lower branches so as to facilitate cultural practices. The farmers are not trained to perform this delicate operation. If these lower branches are not pruned, the weight of the fruits will cause them to touch the soil, facilitating in this manner the infestation by pathogens of the fruits and/or the branches. The market potential of these fruits is hence-

forth reduced and the whole tree suffers. For the production and release of the plants by the nursery, "standards" should be defined and enforced. This will serve to guarantee the quality of the plant. Among other things, the height of budding should be standardized; plants leaving the nursery should be "trained", with minimum sizes and specific number of branches, and the authenticity of the cultivars should be guaranteed.

CHAPTER V: CULTURAL PRACTICES

1. Clearing and land preparation for the planting of fruit trees in Grenada are normally done by spot clearing - manually weeding around the spot where the hole is to be dug. Regardless of the physical condition of the soil, the land is neither ploughed nor forked. Drainage ditches are only found where fruit trees are intercropped with bananas or cocoa and planting mounds are seldom formed, even under poor soil drainage conditions. Holes are dug shallow and only large enough to accommodate the ball of soil and root.
2. A high level of intercropping of tree crops is practiced in Grenada, with banana and cocoa being the main crops. A definite planting system is seldom recommended or used. Plants normally are distributed randomly with the aim of establishing as many plants as possible in the existing space. Consequently, overcrowded planting is commonly the result, with trees growing weak, slender and tall.
3. While historically windbreaks have been a major feature of Grenada's agriculture, very little replanting or new plantings is presently being done, in spite of the need for both.
4. There is no fertilization programme recommended and/or directed to fruit trees. Only when interplanted with cocoa or banana, do fruit trees receive some marginal amounts of fertilizer.
5. Except for trees in backyard plantings, most fruit crop plantings in Grenada are rainfed. Yield is considerably reduced by long dry spells, since complementary irrigation is not available.
6. Fruits in the intercropping system receive indirect benefits from many of the cultural practices applied to the main crop. However, the use of herbicides in multicropping systems in Grenada often results in damage to the fruit trees by drifting of chemicals. Fruit plantings in Grenada are often choked by vigorously growing weeds and delays in weeding.
7. There are no routine spray programmes designed to control pests and diseases in fruit crops and these crops are normally bypassed during routine spraying operations of bananas and cocoa. The uncontrolled heights to which fruit trees grow, the lack of both proper equipment and chemicals and the feeling among farmers that fruit trees can take care of themselves (in some cases net profits to farmers are maximized by minimizing his production costs) are the main constraints to the effective implementation of a spray programme for fruit trees in Grenada. The World Bank project has initiated a pilot programme to evaluate the impact of spraying on the production and quality of mangoes.

8. Pruning is either neglected or inadequately undertaken. It is not uncommon to see grafted plants in which the stock has overgrown the scion and, as a consequence, the latter fails to develop and eventually dies.
9. The poor cultural practices applied to tree crops often result in low yields and poor quality of the fruits produced in Grenada.
10. Technical assistance provided farmers for fruit crop production is insufficient to sustain a fruit development programme. Most extension agents tend to be generalists and have a broad range of responsibilities. Further, there is little opportunity for their systematic training in fruit production and postharvest handling.

CHAPTER III: BIOLOGICAL AND PHYSICAL FACTORS AFFECTING FRUIT PRODUCTION/MARKETING

1. A number of minor pests attack mangoes in Grenada. Sucking insects, e.g. aphids, mealy bugs, thrips and scales, feed on young plants. Such feeding can cause distortion of leaves, retard development and possibly cause death of young plants. These insects also affect citrus, avocado and breadfruit to some extent. When the fruits are infested the result is reduction in size and quality, consequently, poor marketability.
2. The June beetle (*Scarabaeidae*) attacks the mango's roots in the immature stages while the adults feed on the flowers. With severe infestations the whole crop can be destroyed.
3. A weevil, possibly *Diaprepes* spp., has been observed on breadfruits. The adults feed on the leaves while the immature insects live under the bark. Severe infestation usually kills the trees. So far these attacks have been isolated. Control can be effected, if applied early, by pruning affected branches and spraying with an Organo-Phosphate insecticide; e.g. Folithion.
4. In Grenada, there are no organized control practices for these pests. If one is to commercialise the industry, however, a pest management programme must be developed.
5. Anthracnose is the most widespread and serious disease of mangoes and avocados, particularly in the higher rainfall areas and for certain varieties (e.g. Ceylon, Imperial). The disease causes leaf spot, wither-tip of young twigs, blossom blight and fruit-rot. Control is possible by the application of benlate or a copper fungicide before the flowers open.
6. Root rot caused by *Phytophthora* spp. is an important disease of avocado, especially under water-logged conditions. Cercospora spot and scab, *Sphaceloma perseae* also attack the leaves and fruits of the avocado. No control measures are practiced for these problems.
7. Melanose caused by fungus *Diaporthe* spp. is important. The fungus attacks the leaves and fruit. When infections are numerous, masses of solid scar tissue are formed. Severely affected fruits may be very small and may

split as they approach maturity. Pruning dead twigs reduces the amount of infection.

8. Gummosis infection may occur through an injured bark or through wounds. No control is practised.
9. Moko is an important disease of plantain in Grenada. There is presently an eradication programme underway against the disease.
10. The importance of agronomic and cultural practices in the whole production system must be emphasised. Height, drainage, weed control and soil conservation, all of which affect yields and quality must be appreciated by the farmers and extension service of the MOA.
11. An integrated pest management programme should be developed.
12. Plant quarantine services in Grenada offer inadequate defence against the entry of exotic diseases/pests. Insufficient staff, lack of training and lack of facilities for treatment and destruction of infested materials are the major constraints. These are compounded by the fact that the public and sometimes the Plant Quarantine and Customs officers, are unaware of the real dangers posed to agriculture by some plant pathogens.
13. Surreptitious entry, especially of ornamentals and fruits, is common. The need for a strict monitoring and Plant Quarantine Service cannot be over-emphasised.

CHAPTER VII: FARMER ORGANIZATIONS INVOLVED IN PRODUCTION/MARKETING

1. In May of 1986, there were only ten identifiable farmer organizations in Grenada. Others may exist but are in the pre-co-operative or preliminary phase of organization.
2. These ten organizations can be divided into two groups: four traditional commodity associations or societies dealing with nutmeg/mace, bananas, cocoa and minor spices on the one hand, and six, more recently formed organizations, whose members grow a wide variety of produce including root crops, vegetables, fruits and sugarcane, on the other.
3. The principal characteristics of these two groups of farmer organizations are summarized below:
 - a) Traditional societies: At present there are four societies which fall into this group, some of their characteristics follow:
 - They have been in existence for between 15 and 39 years.
 - They each specialize in one export crop.
 - Their memberships are relatively large, ranging between 500 and 8,000 farmers.
 - They provide a wide variety of services including input supply, pest/disease control, information on production/marketing, extension, training and transportation.
 - They carry out marketing functions including assembly, purchasing, grading, processing, transport, packaging, storage, and price supports.

- They tend to be relatively well managed and have significant investments in infrastructure and equipment.
- Their annual sales of produce range from EC\$0.5 million (MSCMS) to EC\$12.5 million (GCNA) and, between them, total annual exports have reached as much as EC\$35 million.
- These four farmers organizations provide employment for over 1,100 persons.

b) Non-traditional farmers organizations: There are six of this type. They are characterized by:

- They have been in existence between two and ten years.
- Some like the Cane farmers (sugar cane) and Carinut (peanuts) are specialized in one crop. The others produce a range of crops from the traditional spices, cocoa and bananas to roots and vegetables.
- Their memberships vary considerably in size. Three of the six have less than 10 members. The Cane growers report 107 members, Concord and New Hampshire, 200 and The Productive Farmers Union boasted 800 members at one time. This latter organization is presently undergoing internal restructuring and reorganization. Its' principal purpose is oriented towards the integration of the movement rather than agricultural production per se.
- They tend to be less well developed than are the traditional societies and provide only limited services (farm input supply, training and/or ploughing) to their members.
- Their marketing functions tend to be little developed.
- Their organizational and management structure is weak and their assets and resources are minimal.
- Total annual sales for these six organizations in 1985 did not reach EC\$70,000 and between them they employ fewer than 10 persons.

4. Whereas the traditional organizations can be considered dynamic, they are highly specialized and dedicate fulltime and all their resources to resolving the production/marketing problems related to their particular crop of interest. With their present dedication to one crop, or crop group, they tend to show little interest in extending their activities to other crops.
5. The non-traditional farmers organizations are interested in any activity which will increase their members net returns. Although all of their efforts are presently directed at production for the domestic market they would be interested in production for export if markets can be assured. However, the present production of non-traditional tree crops by their members is diverse and represents very small volumes.
6. The non-traditional farmers organizations are extremely weak organizationally and extremely deficient in human and financial resources.
7. Two organizations, Concord/New Hampshire and National Productive Farmers Union, are potential catalysts for the new farmer movement but they will require considerable strengthening in management and the development of basic services - two key areas for the success of any farmers' organization.
8. Whereas the traditional societies can function as commercial enterprises, the youthful non-traditional groups cannot. These latter will require considerable technical assistance, training, grant funding, etc. from

donor agencies. To date, some external assistance has been received, principally from HIVOS, for the PFU Center at Grenville. Locally, some assistance is provided by MOA, Co-op Department, CARDATS and a significant role has been played in the strengthening of Concord/New Hampshire by ART and the French technical assistance mission. ART has also played an important role in assisting CARINUT in developing its peanut production capabilities. All these efforts, while being very positive, are insufficient to put these new organizations on a sound operational footing.

9. The extra-regional marketing of non-traditional tree crops (mangoes, avocados, citrus, soursop, sapodilla, etc.) will require a strong, well managed private sector involvement. Although ideally this could be best achieved by a farmers' organization, following a modified model of the traditional commodity societies, there presently does not exist a farmers' organization in Grenada capable of taking on this role.
10. The organized production of tree crops requires from three to five years for the developmental phase. This is a relatively short period of time to build a farmers' organization.
11. A concentrated effort should be made to identify, or create, and strengthen one or more farmers' organizations which would ensure direct farmer involvement in the future production/marketing of non-traditional tree crops.

CHAPTER VIII: DOMESTIC MARKET FOR FRUITS

1. Fresh produce from Grenadian farmers reach the final consumers directly from the farmer himself, or more commonly, through diverse intermediaries including municipal market vendors, supermarkets, traditional shops, the Marketing and National Importing Board, hotels, restaurants, institutions (hospitals, military garrisons) and agro-processing enterprises.
2. In 1985, data collected by the MOA showed a total of 1,997 tonnes of fresh produce moving through the public markets (71%) MNIB (24%) and supermarkets/hotels (5%). In the case of fruits, these percentages vary only slightly and are as follows: 75%, 21% and 4%, respectively.
3. Most fresh produce, including fruits, moves through one of five municipal markets, of which St. George's is by far the largest and is the only one which operates six days a week, the others being weekend farmers markets. In 1985, approximately 1,425 tonnes of fresh produce were retailed in these markets of which 38% (563 tonnes) was fresh fruits.
4. The MNIB has one retail outlet, located in the center of St. George's. In 1985 the MNIB retailed 467 tonnes of fresh produce, including 160 tonnes of fresh fruit.
5. There are five supermarkets in Grenada. Four are located in St. George's and one in Grenville. In 1985, less than 20 tonnes of fresh fruits were marketed through these outlets.
6. The twelve principal hotels in Grenada purchased less than 15 tonnes of fresh fruits in 1985.

7. Cruise ships purchases of fresh produce are minimal, however, with 257 cruise ship calls expected in 1987, there may be a strong potential market here. Other local markets for fresh fruits, excluding agro-processing and exports, are thought to be insignificant.
8. Total sales of fresh fruits in the principal domestic markets in 1985 were probably less than 800 tonnes. This does not include that consumed on the farm or given/sold to neighbours, family, along roads, in small shops, etc.
9. With respect to types of fruit sold, the order of importance in terms of volumes is as follows: green bananas, plantain, bluggoes, citrus, mangoes, avocados, breadfruit and others.
10. The present domestic market for fruits is small. Factors which could lead to an increased domestic demand are: overall economic growth (increase in consumption), controls on imports, growth in the tourist industry (hotels and cruise ships) and a stimulation of the agro-processing sub-sector.

CHAPTER IX: AGRO-PROCESSING

1. There are twelve agro-processing industries in Grenada which process tree crops or other types of fresh agricultural produce. All of these can be categorized as small scale home and cottage industries.
2. The twelve industries employ a total of 67 persons of which 49 are labourers, 6 are technical and 12 are administrators/owners.
3. Whereas the cottage industries have between 200 and 1200 sq. ft. of floor space and employ from four to fourteen persons, the home industries have less than 200 sq. ft. of floor space and employ from three to five persons.
4. The twelve firms utilize 25 different types of locally produced raw material of which 14 are tropical fruits (spices, beverages, etc. excluded) processed by eight firms.
5. From these 14 tropical fruits, the eight firms produce 16 different products, including candies, juices, syrups, jams/jellies, chutney, mixed fruits and wine.
6. Of the eight firms processing tropical fruits, five produce only one product i.e. nutmeg, orange and grenadine syrups, nutmeg jam and mango chutney. One produces only wines, while the remaining two, Grenfruit and Lonnie's, produce a wider range of products (candies, jams/jellies, syrups, spices, mixed fruits).
7. Since the enterprises are small few operators keep statistics on raw material purchases; however, volumes of fruits consumed are not great. One of the larger operations, Grenfruit, sold EC\$32,000 in candied fruits and EC\$10,000 in ground spices in 1985. All fresh produce processed by these home and cottage industries in 1985 is thought to be less than 35 tonnes.

8. Whereas the home industries operate out of inadequate, unsanitary and makeshift facilities, the four cottage industries have spacious, well ventilated and better organized facilities.
- 9 With a few exceptions, these small scale industries lack technical expertise and operate on an empirical basis.
10. Equipment used ranges from domestic utensils to more sophisticated steam generators and pulper finishers. Although the equipment is normally over 15 years old, in many cases it is adequate.
11. The lack of access to institutional financing creates a serious constraint for the small operator.
12. Most packaging material is imported and very expensive. This serves as a severe limiting factor to the development of agro-processing, particularly for the very small operator who cannot afford to maintain inventories.
13. Most products are sold on the domestic market; however, firms like Funtime (seamoss), De La Grenade (liquor/rum punch) and Grenfruit (Danson) have been able to export small amounts of their specialized products to regional markets.
14. Most of the industries are located in St. George's or St. Andrew's and have access to basic services such as water, electricity and telephones. However, interruptions in services occur frequently.
15. The Produce Chemist Laboratory is operative and provides technical advice on formulations, plant sanitation and quality control. These services are provided by three well trained professionals and two laboratory technicians.
16. The Grenada Development Bank provides loans to those agro-processors who are able to provide the collateral.

CHAPTER X: TRADE IN FRESH PRODUCE

1. In 1984, Grenada imported goods valued at EC\$155.5 million. Of this amount, less than 0.5% represented imports of fruit or fruit products.
2. Of the total value (EC\$624,558) of fruit/fruit products imported in 1984, 46% (EC\$288,614) was fruit juices, 18% (EC\$109,364) was fresh fruit (mainly temperate), 11% (EC\$66,124) was preserved fruits, 11% (EC\$65,837) dried, 4% (EC\$21,927) jams/jellies and 10% (EC\$64,574) others. Given this breakdown and present demand, it appears that the potential for import substitution in fruit products is minimal.
3. In respect of non-traditional exports, there has been considerable growth in the past six years. Whereas shipments by huckster/traffickers were estimated at 679 tonnes in 1979, by 1985 these estimates were in the range of 6,000 tonnes/annum.
4. Nearly 100% of these non-traditional exports are destined for Trinidad and approximately 97% are fruits, principally green bananas (20%), plantain

(18%), sour sop (16%), golden/sugar apples (13%), avocados (10%), mangoes (10%), sapodilla (3%), plums (3%) and others (7%).

5. The MNIB exported only 13 tonnes of fresh produce in 1985, down from a high of 62 tonnes in 1981. Since no other private sector traders operate out of Grenada, the export of non-traditional commodities remains almost exclusively in the hands of the trafficker/huckster.
6. The predominance of the trafficker/huckster in the regional export trade would seem to stress the capabilities and potential of this existing system. Constraints in this traditional system are well documented and their removal should be priority goals of government.
7. According to statistics of the Inland Revenue Department, there are currently some 673 huckster/traffickers based in Grenada. They operate independently, without any organizational structure such as that offered by huckster associations in St. Vincent and Dominica.
8. Huckster/traffickers move their produce to Trinidad via three schooners sailing weekly out of St. George's and four making weekly trips from Grenville. Other miscellaneous vessels also carry produce on an irregular basis.
9. The huckster/traffickers have developed their own effective information system, through direct and weekly contacts with both buyers (Trinidad) and sellers (farmers in Grenada).
10. The fact that huckster/traffickers sometimes purchase the fruit on the trees and do the harvesting themselves, with trained crews, indicate their awareness of the need for careful handling during harvest.
11. Close personal relationships have been built up between the huckster and the farmer over time. The farmer will sell his fruits on credit until the next trip (from one to two weeks) and the huckster/trafficker may buy consumer goods in Trinidad for the farmer.
12. Although poor postharvest handling does lead to excessively high losses in Trinidad, the blame cannot be traced to any one type participant, e.g. farmer, trafficker/huckster, schooner owner or government bureaucracy. In fact, given what they have to work with, each group of participants is probably operating at a fairly high level of efficiency. The postharvest losses in Trinidad are a result of diverse causes within an overall deficient system. The reduction of the losses in Trinidad will require introducing changes throughout the system, including harvest, packaging, transportation and import/export policies. For example, improved harvesting techniques or improved packaging will not resolve the problem if the product is mishandled further down the line. A chain is only as strong as its weakest link. Solutions must be put in place on the farm, during inland transport, at the wharf in Grenada, during schooner transport and at the wharf in Trinidad.

13. The three major constraints to resolving the problems of this regional marketing system are the following:

- Inadequate and exceedingly expensive packaging materials;
- Poor handling, stacking and storage during schooner transit;
- Delayed and disorganized off-loading/handling in Trinidad.

Only if these problems are resolved in economic terms will farmers, hucksters and transporters willingly introduce the modifications necessary to reduce the high levels of postharvest losses.

14. Most of the available supplies of fruits are presently destined for Trinidad where the quality demanded is less stringent than extra-regional markets. The MNIB is unlikely to ever be able to compete effectively with the huckster for the available supply. Much of the presently available supply is unsuitable for extra-regional markets.

15. There is a need to address the question: what is to be the role of the MNIB in extra-regional exports? Experience in the region seems to indicate that marketing boards should handle less produce and provide more and improved facilitating services, specifically:

- identification of markets and standards for which production can be oriented (extra-regional markets require organized production for exports);
- technical assistance and training in postharvest handling;
- effective generation/dissemination of price/market information;
- imports of packaging materials in bulk for distribution to hucksters, agro-processors and others.

16. Trial shipments of produce to extra-regional markets is a waste of resources if follow up supply capacity does not exist. The same can be said of the construction of infrastructure for postharvest handling which remains underutilized due to lack of sufficient production.

17. The newly constructed Point Salines International Airport has two chill units (1350 cf) and four freez units (2250 cf). None of these are currently in use.

18. St. Georges' seaport has relatively good facilities for handling ships and for traditional exports; however, facilities for the huckster/trafficker trade to Trinidad are too small to meet the demand.

19. Facilities at the Grenville seaport are limited to a jetty and a wooden wharf used for loading/unloading of the traditional schooners.

CHAPTER XI: ECONOMIC FACTORS INFLUENCING FRUIT PRODUCTION/MARKETING

1. Government's plans, through the Model Farms Project, to divest most of its agricultural lands on a lease-purchase basis will significantly increase lands available for tree crop production.

2. Agricultural lands are valued based on the extent and type of cultivation, accessibility, proximity to irrigation water source, public main road, or residential areas, topography and soil type. Sheltered agricultural lands

(valleys) will normally fetch a higher price than steep (>15 degrees) hillsides. Agricultural lands with no residential or industrial potential are sold on a per acre basis. The current price range per acre is EC\$6,000 to EC\$12,000. Non-agricultural lands or agricultural lands which may be used for activities other than farming are valued at EC\$1.00 to EC\$1.50 per sq. foot in rural areas, and EC\$2.00 to EC\$3.50 in urban and suburban areas.

3. Farm labour productivity is considered low. The established wage rates for male and female workers are EC\$13.50 and EC\$11.00, respectively. Large scale farm mechanization is not practical because of the difficult terrain. Labour costs account for approximately seventy-five percent (75%) of the total cost of establishing an acre of fruit tree crops. Land clearing and establishment and maintenance of drains are other major items of expenditure.
4. Agricultural credit is available from two major sources: commercial banks and the Grenada Development Bank (GDB). Commercial banks provide credit with interest rates of 12.5 to 14.0% per annum. Such credit is usually in the form of short-term loans which must be repaid within three years of the loan being disbursed. Loans obtained from the GDB carry interest rates of 9.5-14.0% per annum. These may be given on a short, medium or long term basis. Long term loans are normally for a period of seven (7) years, but may be extended to ten (10) years in "special cases".
5. The recently (1985) initiated 5-year Agricultural Rehabilitation and Crop Diversification Project has, through the GDB, made approximately EC\$5 million available to be lent to farmers. The rate of interest to be charged by the GDB is 9.5% per annum. Loans will be for periods of five and ten years with grace periods of two and five years, respectively. Furthermore, during the first three years after the termination of the project, additional loan funds will be made available to farmers for on-farm investment activities.
6. Previous attempts at increasing production of non-traditional crops through lending have not been successful. Some of the reasons for the low level uptake of agricultural loans are:
 - Lack of a stable market for non-traditional commodities, low prices and high input costs;
 - The perceived high rates of interest on agricultural loans;
 - Farmers have little collateral and fear risking their land;
 - Farmers often prefer to use other sources of income such as non-farm employment, remittances from abroad and informal sources;
 - Bananas, and to a lesser extent, cocoa, nutmegs and bananas generate income year-round thus reducing demand for credit.
7. High input costs, with the consequential low input use, has adversely affected both the quantity and quality of fruits produced. Fertilizers and pesticides needed for fruit tree crop production must be purchased from commercial dealers, and may cost about 20-30% more than those purchased from Commodity Associations for use in cocoa and banana cultivations.
8. Except for cardboard cartons, packaging materials used are durable and therefore re-usable. However, empty containers are not always returned

from the Trinidad trip. Used sacks are obtained either free, or at a cost of EC\$2.00 each. Baskets and crates cost between EC\$20.00 and EC\$40.00 each, based on size.

9. Fruits are often transported on head for long distances (up to two miles) from farm to home or to a point accessible to motor vehicles. Four-wheel drive vehicles are most appropriate to local farm road conditions. These are, however, relatively expensive to purchase and maintain. They are few in number and are not easily available for hire. Public transport buses are for passengers only. Only a few (less than 20) of the privately-owned buses have the capacity to transport fruits. Moving large quantities of fruits thus requires the hiring of a truck or pick-up vehicle.
10. Hiring a vehicle to transport fruits is costly. The charge is based mainly on road condition, distance, quantity of produce transported, and type of vehicle. From Grenville to St. George's a truck charges about EC\$160.00 to EC\$240.00. About 50% less is charged by land rovers, vans and pick-up vehicles.
11. The current costs of a truck, a land rover, and a pick-up are approximately EC\$120,000, EC\$50,000 and EC\$40,000, respectively.
12. Gasolene and diesel fuel costs approximately EC\$5.00 and EC\$4.00 per gallon, respectively.
13. Transportation by schooner to Trinidad is charged at the rate of EC\$5.00 per package.
14. One of the main reasons farmers do not go into organized production of fruit tree crops is the absence of reliable markets such as those for traditional crops such as cocoa, banana and nutmeg. These currently receive an acceptable price and have a sure market. Thus fruit tree crop production is at a disadvantage when competing for the farmers land, labour and limited capital.
15. Fruit producers visualise the "market" in terms of the Trinidad scene: consumers willing to pay high prices for fruits, regardless of quality.
16. An excellent road network exists in Grenada. However, many roads, particularly farm and feeder roads, are in a state of disrepair. The situation is rapidly improving. The Farm and Feeder Roads Projects which commenced in 1981 are still in progress. More than 40 miles of road have since been repaired. Through the Eastern Main Road Project (1981-1986), approximately 20 miles of roads have been resurfaced.
17. Many potential fruit-producing areas are inaccessible to motor vehicles. A high proportion of harvested fruits (including bananas) is unmarketable because of damage caused when such fruits are transported along unsurfaced and pot-holed roads. The Farm and Feeder Roads Projects represent government's efforts to ensure that roads do not continue to constitute a major constraint to agricultural production.
18. Farm and feeder roads are highlighted as one of the four major activities of the current World Bank-funded Agricultural Rehabilitation and Crop

Diversification Project. This project will be establishing a farm and feeder road maintenance system.

CHAPTER XII: INSTITUTIONAL ANALYSIS

1. The Ministry of Agriculture (MOA), officially known as The Ministry of Agriculture, Forestry, Fisheries, Lands and Tourism, is the major institution responsible for fruit production and marketing. All other agricultural institutions (national, regional and international) operating in Grenada are supportive in function. The level of organization and resourcefulness of the Ministry will therefore influence the pace of development of the fruit tree crop sub-sector.
2. Guidelines and strategies outlined by the MOA are clear and definite in policy areas such as land reform, import substitution, agro-processing and natural resource management but unclear in the policy areas of generation/transfer of technology, development of farmers organizations, agricultural credit, marketing and export development.
3. Of the one hundred and eighty-seven (187) established staff positions in the Ministry of Agriculture (excluding Tourism), nineteen (19), equivalent to 10%, remain unfilled. Several of the most qualified technicians have been seconded either to Statutory Bodies (e.g. Commodity Associations) or to Regional/International Organizations. The one hundred and sixty eight filled positions include 41 extension personnel, 41 conservation/land use/land and survey personnel, 21 working in veterinary services and livestock production, 13 in plant propagation and 12 in plant protection, among others.
4. The planning unit within the MOA has been relatively inactive in recent years but, although presently understaffed, is beginning to show renewed life in initiating planning functions. The Central Planning Unit, located in the Ministry of Finance, Trade and Planning, is currently non-functional. Monitoring and evaluation of projects is a limiting factor.

On going or in-pipeline agricultural development projects which impact upon the fruit sub-sector are the following:

Title	Donor Agency
1) Moko eradication phase II	EDF
2) Increasing MOA plant protection skills	IICA
3) Fruit crop development	UNDP
4) Analytical chemist (produce chemist lab.)	UNDP
5) Agricultural action plan	OAS
6) Mirabeau seedling centre	ART/HIVOS/PFU/Govt.
7) Farmer registration project	FAO
8) Strengthening of pest management and establishment of plant quarantine services	FAO
9) Prevention of food losses	FAO
10) 4H tree crop cultivation	USAID

Title	Donor Agency
11) Pest control services	USAID
12) Agricultural rehabilitation and crop diversification	WBP/IDA
5. A relatively high percentage (25%) of the MOA technical staff lack formal agricultural training. Technical assistance programmes undertaken by regional/international agencies often have difficulties obtaining counterpart staff of a suitable level.	
6. Government's total contribution towards implementation of the above mentioned projects is approximately US\$1.5 million.	
7. Limited office space and unavailable secretarial and counterpart technical staff are sometimes cited as reasons for delays in implementing development projects.	
8. It will require a major and sustained effort to strengthen the MOA institutional capacity to offer the necessary services for the satisfactory development of the fruit sub-sector. This will entail a technification of staff but not necessarily any overall increase in total number. Staff remunerations would have to be structured so as to attract additional suitably qualified and competent persons.	
9. The Marketing and National Importing Board (MNIB) and the Grenada Development Bank (GDB) play essential roles in supporting activities of the Ministry of Agriculture.	
10. Despite the strict terms laid down, a high proportion of loans disbursed by the GDB is in default, and this situation has greatly reduced the bank's lending capacity. There is need for the GDB, in consultation with the CDB, to work closely with the Ministry of Agriculture and the MNIB in re-designing its lending policy to suit the needs of fruit tree crop producers.	
11. The MNIB may be restructured but no final decision has yet been made as to the form which it is to take. Its storage and packaging facilities have been expanded so as to allow for the handling of perishable agricultural commodities and some trial shipments of breadfruit to Miami have been made but without economic success.	
12. The Produce Chemist Laboratory is well equipped to provide technical support services to agro-industrial entrepreneurs. Its activities are expected to catalyse the growth of local agro-industries which will utilize large volumes of fresh fruits.	



APPENDIX 3

CONCLUSIONS ST. LUCIA

CONCLUSIONS ON ST. LUCIA

The following conclusions have been summarized from the St. Lucia country report prepared by IICA during the period January - July 1986 and published as a separate document.

In the preparation of the original country document, the following persons made valuable contributions with information and/or special reports.

<u>NAME</u>	<u>SUBJECT AREA</u>
Everton Ambrose	Pests and diseases
Dunley Auguste	Fruit quality research
Terry Baptiste	Trade statistics
Deborah Bushell	Natural resources
Robertina Casseau	Cultural practices and tree crop farmer research
Vasantha Chase	Socio-economic characteristics of farmers
Carlos Dusauzay	Agricultural credit
Michael Griffin	Marketing
David Jackson	Crop characteristics and cultural practice
Norman Joseph	Cultural practices
Henry Lubin	Agro-processing
Clarence Michel	Institutional analysis, transportation
Colin Paul	Plant propagation and fruit quality
Andrew Satney	Marketing
Jan C. Vermeiren	Natural resources

The supervision, assembly and editing of the final country report was carried out by: Jerry La Gra, marketing specialist and project coordinator, IICA Office in St. Lucia, and Rafael marte, fruit production specialist, IICA Office in Barbados.

CHAPTER I: NATURAL RESOURCES

1. With the exception of excessively strong winds and occasional prolonged dry spells in specific regions, St. Lucia has ideal climatic conditions for the growing of tropical tree crops: Annual mean temperature 24.6 degrees C., ranging from 21 to 29 degrees (72 - 85 degrees F.), relative humidity between 60 and 90 %, and an annual mean rainfall of 1750 mm (68.3 in), ranging between 1800 and 2500 mm (70 - 100 in) over most of the country, reaching 3810 mm (150 in) in some mountain areas.
2. Tropical hurricanes represent a threat during the period June-November, however, since 1900 only a few hurricanes have done significant damage. Some fruit species withstand winds better than others and when naturally pruned by hurricane force winds will come back into production within 2 - 3 years.
3. St. Lucia is divided into three main physiographic regions offering a wide variety of micro climates and soil conditions in which a relatively wide range of fruit species and cultivars can be grown; however, zoning is a necessary precondition. Rainfall gradually increases from the coastal areas towards the central mountains.
4. Given the mountainous nature of St. Lucia, much of its 152,248 acres of land is best suited for permanent tree crops: 23 % of the land area is less than 5 percent slope; 77 % is over 5 percent; 67 % is over 10 percent, and 42 % is over 20 percent slope. The selection of proper planting and intercropping systems is important in the control of soil erosion.
5. Of the total land area in St. Lucia, 83 % falls into land capability classes VI and VII which are best suited for permanent tree crops, considering slope, potential for erosion of top soil, fertility and stoniness.

CHAPTER II: HUMAN RESOURCE BASE: SOCIOECONOMIC CHARACTERISTICS OF ST. LUCIAN FARMERS

1. The farming systems that have evolved in St. Lucia are a combination of extensive plantation agriculture and intensive small farm agriculture, made more complex by a wide variety of ecosystems and tenurial arrangements.
2. The small farmer in St. Lucia has developed a system of resource allocation, cropping patterns and technologies that emphasize heterogeneity. It is this heterogeneity, expressed through polyculture and a variety of tenurial arrangements, that enables the small farmer to spread risks so that farming becomes economically viable.
3. Multicropping systems are common in the single enterprise and can be said to take the form of a combination of different tiers, i.e. root crops and vegetables in the bottom layer, semiannuals and annuals in the second layer and perennials in the third and uppermost layer.

4. Some small farmers have tenurial arrangements whereby they have the use of a piece of land for short term crops (bottom layer) on the condition that they plant and maintain permanent tree crops. This arrangement lasts only until the tree crops reach maturity.
5. The 1973-74 agricultural census shows that 92 % of the farm holdings were less than 10 acres in size, accounting for 24 % of the total agricultural land area. Some 80 % of the farms reported having fruit trees.
6. The general land ownership pattern is for flat alluvial soils to be held in larger estates. The higher the elevation, the smaller the farm size and the poorer the soil conditions.
7. In 1975 an estimated 64 % of agricultural land was reported to have multiple owners (family owned) often without clear title. This appears to be one of the more serious obstacles to long-term agricultural development, particularly of tree crops. Although a national land titling project will be completed in 1987, the problem of multiple owners of the same piece of land will remain as a constraint for long-term investment.
8. The predominant ethnic group within small farm agriculture is of African descent. There are a few small pockets of farm families of East Indian and Carib descent. These tend to be located in low lands and primarily dedicated to the production of vegetables and ground provisions.
9. It is estimated that 50 % or more of the heads of households in St. Lucia are women. Females outnumber males in every category over 10 years. Although the majority of the farmers are male, the role of women in planting, production and especially marketing is very substantial.
10. Almost two-thirds of the nation's people are under 25 years of age, while the average age of heads of farm households is over 47 years; thus, a large rapidly increasing youthful population is dependent on a small, older generation of farmers.
11. The unavailability of land and difficult access to agricultural credit, combined with youths' low level of preference for agriculture, results in a low level of mobility into farming.
12. The stir and lights of Castries serves as a magnet for the rural population; some 38% of the total population now lives in this town.
13. Three general types of farmers can be identified in St. Lucia:
 - Commercial: farmers who obtain the largest proportion of their income from farming. This group includes the large estate owners as well as family farms.
 - Semi-commercial: those for whom a significant part of the family income is derived from farming.
 - Non-commercial (subsistence): farmers who only make occasional small sales.
14. Commercial type farming operations tend to be located at altitudes below 50 m, semi-commercial operations at elevations between 50 and 150 m and non-commercial operations above 150 m. The exception to this is banana which tend to be grown at a wide range of elevations.

15. Commercial farms tend to sell their produce (bananas, cocoa) in extra-regional markets. Production from semi-commercial farms includes a wide range of crops which are sold in domestic, regional and extra-regional markets. Production from non-commercial operations, when sold, is normally destined to domestic and sometimes regional markets.
16. It is virtually impossible to isolate groups of farmers or individuals who cultivate only tree crops. The norm is to cultivate a wide range of crops.
17. St. Lucian farmers tend to base their decisions on a rational evaluation of costs and returns, balanced by potential risks, and act accordingly.

CHAPTER III: CROP CHARACTERISTICS AND GROWING CONDITIONS

Cultivars, Harvest Seasons and Production

1. Julie and Graham are the two most important mango cultivars grown in St Lucia. They both have a relatively good demand but the shipping quality of Julie is not good and Graham is prone to anthracnose disorders. There are more than 15 local "wild type" mangoes, however, many of these have limited market potential. These wild mangoes, which constitute the majority of the mango trees in St. Lucia, might be topworked using cultivars with high extraregional demand.
2. The harvest period for mangoes in St Lucia extends from April through September with the peak of production in June-July. There is a gap between November and March in which mangoes are seldom available. Early and late high quality cultivars should be selected and introduced for study of their performance at different locations, with the view to filling this gap.
3. Selected mangoes such as Julie, Graham, Imperial and others are more demanding in maintenance than the so called "wild mangoes"; therefore, farmers should be properly instructed in the best way to manage them. This is especially true with some of the introduced Floridian mangoes such as Keitt, Kent, Haden and others, which are shy bearing mangoes unless properly located and managed.
4. Present production of mangoes from grafted trees has been estimated at 450 tonnes (BDD). The projected production by 1995 is expected to reach 1860 tonnes. The discovery of the mango seed weevil in some areas of this island has led to the loss of the regional market (principally Barbados) as well as the potential USA market. Market opportunities for mangoes, therefore, are limited basically to Canada and Europe, where competition is keen. The need for good national and regional planning of the species, cultivars and acreages to be grown thus becomes essential. This applies to all other fruits as well.
5. Of the selected avocados, Lula and Pollock are the two most important in terms of acreage planted. However, the bulk of production comes from many non-selected local types, growing as volunteer seedlings. Because of their high variation in shapes, sizes, skin thickness, color and texture, tolerance to cold storage etc., they may be a good source for selection but at present have a limited market potential. As with wild mangoes, these local

types of avocados can also be topworked with selected, highly demanded cultivars thereby upgrading present supplies.

6. The avocado season extends from July to early January with a peak in September and October. A gap in production exists from mid January to late June. Early and late cultivars such as Booth 7, Booth 8, Semil 34, Gripina 5, Hall, etc. have shown good performance in Dominica, Puerto Rico and Dominican Republic. These cultivars should be introduced to St. Lucia to study their performance under different growing conditions.
7. Present production of avocados from grafted trees has been estimated at 120 (BDD) tonnes. The productivity by the year 1995 is expected to reach 300 tonnes per annum. These figures do not include the production from seedling avocados. This production can be expanded, in both quantity and quality, by initiating a programme to topwork seedling avocados with carefully selected cultivars.
8. The orange cultivar "Valencia late" has been mixed with other cultivars such as Parson Brown, Hamlin, Jaffa, Pineapple, etc. In fact, in St. Lucia, the so called "Valencia late" is harvested at the same time as the mid-season oranges. Because of its broad adaptation, the double purpose of its fruit (fresh and processing), and its quality and lateness, it is the sweet orange cultivar with most potential. For this reason, some of the improved selected nucellar clones should be introduced from reliable sources (Budwood Registration and Certification Programmes).
9. Farmers give preference to Washington navel because of the strong demand for it on the local market. However, since this market is very limited and the Washington navel is not a good orange for processing, additional plantings of this cultivar should be made with caution.
10. Marsh seedless, Duncan and Ruby Red are the most important grapefruit cultivars in St. Lucia. They attain good eating quality when properly maintained.
11. Other Citrus, such as Mineola tangelo and Ortanique, are grown on a very limited scale. These hybrids seem to have a good regional market but the poor external and internal fruit quality obtained in St. Lucia will have to be improved. This can be achieved by planting in proper locations (zoning) and through proper management of orchards.
12. Dancy is the main cultivar of mandarine grown on the island. Its small size may be a limiting factor for the existing market. The size can be improved with the use of Rough lemon as rootstock. There are some mandarine selections which are more adapted to the tropics and, under similar conditions to that of St. Lucia, are producing numerous fruits of good size and quality. These should be introduced from other countries, e.g. Dominican Republic.
13. While the West Indian lime is by far the most important "cultivar" in this island (80% of the total), the great diversity of types is a handicap to its market potential. An attempt to select the best clones should be made in order to obtain a uniform, high quality and productive clone. Tahiti lime has been introduced and seems to have good market potential.

14. Present and projected production (tonnes) of citrus in St. Lucia has been estimated (BDD & OCPD) as follows:

	<u>Present Production</u>	<u>Projected for 1995 *</u>
- Oranges:	600	1500
- Grapefruit:	400	1650
- Limes:	100	200
- Others:	100	150

15. Although Breadfruit is an important crop in St. Lucia, no named or selected cultivars exist. A large number of trees of diverse types, some of which are outstanding in their characteristics, are found on this island. The same situation is common to the other Windward islands. There is a need for a good programme that could select and characterize the best clones found. A Germplasm bank of over 100 breadfruit selections, including several dwarf types, is well established and managed by the Department of Agriculture of the Fiji Islands.
16. Present acreage and production of breadfruit has been estimated at 750 acres and 1500 tonnes. The projected production for 1995 is 3000 tonnes per annum (BDD).

Growing Areas and Conditions

17. There is a misconception that fruit trees can be grown in any kind of soil and climate and still produce good quality fruit. In fact, many persons refer to fruits as crops for marginal lands. While it is true that some fruits have a wide range of adaptation to different soil types and climates, experience has shown that good quality and yield are only obtained when they are grown under conditions that meet their requirements.
18. The island of St. Lucia has ideal ecological conditions to produce good quality fruits of various species such as mango, avocado, breadfruit, pineapple, orange, grapefruit, pummelo, lime and some of the mandarine hybrids. The same is true for some nontraditional exotic crops such as soursop, carambola, sapodilla, papaya, passion fruit, cashew, tamarind and golden apple. Many of these fruits have a limited but increasing potential market in the USA and Europe. However, in order to compete in those markets, good quality fruit must be produced. This can only be achieved if these species are concentrated in and allocated to the best possible and most suitable ecological zones within the country. This will require crop zoning by regions and the institutionalization and strengthening of facilitating services.
19. The high mortality rate for young fruit plants in St. Lucia (35% for Citrus, 26% for avocado and 16% for mango during the first 5 years), is mainly due to the fact that fruit trees are often neglected, especially when intercropped with bananas.

* These are very rough estimates which assume continued farmer attention to trees planted under the OCPD.

CHAPTER IV: PROPAGATION AND DISTRIBUTION OF PLANT MATERIAL

1. The Propagation and Distribution Unit of the MOA is a key element in any attempt to develop perennial crops.
2. Although the nurseries are relatively successful in producing and distributing a number of plants, the lack of technical controls will result in unnecessary production-related problems in the orchard. It is much simpler and less costly to prevent problems in the nursery than to correct them once the orchard is established.
3. The MOA nurseries have several buildings in fair condition, but others need major repair work. The nursery component of the "St. Lucia Structural Adjustment project" (USAID) is contributing to facilitating the overall propagation process. However, at the present time there is no facility and/or equipment for the sterilization of soil media for bins and potting nor is it contemplated in the USAID financed project. The sterilization of the media can be considered essential for the propagation process.
4. Both technical and non-technical level staff have some knowledge of basic nursery operations and practices. However, they lack opportunities for more technical training which would permit the introduction of new techniques and practices, new products, new species, cultivars, and other features necessary to upgrade the propagation process, when high quality and large numbers of plants are required.
5. Planning annual production targets by species for the different nurseries should be a function of farmer demand combined with the consideration of Government policy towards the development of the fruit subsector and expectations for internal and external demand. At the present time, there is an over-production of some species and an under-production of others.
6. The existing museum of species and cultivars is in a deplorable condition and may, in fact, represent a focus of infestation rather than the guarantee of healthy and quality plants. The museum or Germplasm banks should be managed by the users (nurseries), as they are more likely to follow the prevention practices required to maintain the sources of budwood free of potential pathogens and in the best growing conditions possible. There is an urgent need to establish better Germplasm Banks with a Virus Free plot, complemented by a Citrus Virus Indexing programme. To be more cost efficient, St. Lucia might join in an intra-regional effort to establish a Regional Germplasm Bank of fruit trees.
7. The number of cultivars at the museum should be increased, introducing well known early and late cultivars with high demand in the international markets. This will extend the possibilities for a longer harvesting season, thus helping to reduce gluts and scarcity during certain times of the year.
8. The high demand for plants of certain species, e.g. sweet oranges, increases the difficulty in controlling quality and contributes to the release of plants from the nursery before they are actually ready. This situation leads to difficulties and/or problems commonly found in the field: low branching which allows fruit to touch the ground, easy breakage of branches caused by the narrow angle at the junction with the trunk, low

bud or graft union, and others. The definition and enforcement of "Standards" could help to solve many of these problems and guarantee that the farmers will receive plants of high quality and in good condition. Priority should be given to producing adequate numbers of plants of high quality and not to quantity alone.

CHAPTER V: CULTURAL PRACTICES

1. Other than clearing, very little land preparation takes place when planting fruit trees. This may delay the normal development of the tree and indirectly, may be partially responsible for the relatively low rate of survival in young fruit plants.
2. Most fruit trees are intercropped with bananas. Because banana is a high return crop, farmers are often reluctant to eliminate any of these plants to allow development of fruit trees. This results in heavy shading; consequently, fruit trees grow slender, tall and are highly susceptible to the attack of pests and diseases. It is also more difficult to harvest fruit from them.
3. In the majority of cases, fruit trees are planted in a scattered pattern amongst an already existing crop with the fruit trees situated wherever there are convenient gaps. This results in two extremes: broad, open spaces in some instances and, in others, plants so close that they touch. This situation leads to increased costs for cultural practices and harvesting and, in some cases, precludes the possibility of mechanization of the farm.
4. High wind intensity is a constraint to the production of good quality fruit in some of the production areas. It can reduce yields by causing a heavy defoliation or the abscission of flowers or young fruits. It is responsible for external (windscars) damage to the fruit, reducing external market possibilities. Very little use is made of windbreaks to prevent this damage. Casuarina, Galba, Mango, Pomerac and other species grow well in St. Lucia and would be useful in reducing the damage caused by wind.
5. Fertilization and weed control are conducted empirically by OCPD participant farmers. Outside OCPD, farmers rarely apply fertilizers to fruit trees, except when interplanted with bananas. In this latter case the fruit trees receive marginal amounts of banana fertilizer at the same time as bananas, which may not be the appropriate time, the proper types or the correct amounts for the fruit tree.
6. Very few farmers, if any, follow a spray programme for the control of pests and diseases on fruit trees. This often contributes to reduction in yield and fruit quality.
7. Pruning, if done at all, is carried out by the farmer in a very empirical fashion. The lack of pruning often results in trees with low and compact branches which increase the difficulty of carrying on other cultural practices. Furthermore, and due to the heavy load, fruits are often found in contact with the soil, consequently lowering their external, and sometimes internal, quality.

8. Very few orchards are irrigated. Yields are greatly affected in those areas of St. Lucia suffering from long dry spells. In these cases complementary irrigation is recommended where feasible.
9. Technical assistance being provided to fruit farmers is erratic and deficient. Extension agents tend to be crop generalists and lack training opportunity, which limits their abilities to resolve problems affecting fruit crops in the field.

CHAPTER VI: BIOLOGICAL AND PHYSICAL FACTORS AFFECTING FRUIT PRODUCTION AND QUALITY

1. The mango seed weevil (Sternochetus mangiferae), although appearing to have little effect on the quantity and the quality of mango produced, is an important plant quarantine pest. The pest has been found in many areas in the north of the island. No control method is practised and very little is known of its biology and habits under local conditions.
2. Sucking insects (scales, aphids, thrips, mealy bugs) cause curling and distortion of leaves of mango, citrus, avocado and breadfruit. They also cause an accumulation of sap on the leaf surfaces leading to the development of sooty mould. As a result there is a reduction of fruit number and size and a loss in fruit quality and consequently, marketability. These pests are widely distributed throughout the island. Although control measures exist, they are not widely practised. It is necessary to develop proper integrated control practices and create greater farmer awareness of their importance.
3. The citrus weevil (Diaprepes spp) affects the yield either by reducing the foliar areas or by completely destroying the root system and, as a result, killing the tree. The weevil has been found in all the citrus growing regions. It is necessary to establish the stage and most effective time that control measures can be carried out under local conditions.
4. The banana borer (Cosmopolites sordidus), together with certain nematodes, affects plantain, reducing normal plant functioning or causing toppling of the entire plant. The pests are widely distributed, especially since they are also pests of bananas. Control methods are similar to those used for bananas but have not been widely used for plantains.
5. Black pimples and corky galls develop on breadfruit rendering it unattractive to the market and reducing its shelf life. These problems are widely distributed on the island. No control methods are being practised. It is necessary to investigate the cause of this problem and to develop control measures and general management practices for this crop.
6. Anthracnose (Colletotrichum gloeosporioides) causes curling and distortion of the leaves, spotting of the fruits, reduction of fruit set and loss of flowers in mangoes and avocados. The disease is widespread, particularly in the wet areas. Control methods for anthracnose are available but it is necessary to integrate them with proper cultural practices and present the farmer with a meaningful management package.

7. Avocado root rot, caused by Phytophthora cinnamomi, causes death of plants, particularly in areas where drainage is poor. Proper control methods need to be developed for this disease.
8. Greasy spot (Mycosphaerella citris) occurs as slightly raised spots on the underside of affected leaves in citrus and gives rise to heavy leaf loss and hence yield. The disease is widely distributed and control practices should be integrated into management practices.
9. Wither tip of limes (Colletotrichum limetticolum) causes death of the green shoots and corky cankerous areas on the fruit. Control practices have been mainly with copper fungicides. However, this has not been very effective and more work is necessary to develop an effective control method.
10. "Bunchy top" is the most common disease affecting paw paw in St. Lucia. Tolerant cultivars should be introduced and tested before any large scale commercial plots are planted. *Erwinia* spp. is another disease of economic importance which has been found affecting paw paw. Little is known about this disease and in-depth research is recommended.
11. Weeds compete with tree crops for nutrients, water and light and act as a secondary host for nematodes. These plants are present everywhere crops are cultivated. Control measures used are a combination of chemical and manual. Many effective herbicides are present on the market but much confusion exists among the farmers as to their proper use. More systematic research is needed to determine if and how these herbicides affect growth and development of the fruit trees.
12. Fertilizers are not systematically applied to tree crops other than bananas and it is necessary to determine the effects of different fertilizer regimes on yield and fruit quality.
13. Root stock affects vigour, longevity and productivity. There is need to investigate mango root stock for maximum market benefit.
14. Periodicity in mango often makes it difficult to predict annual yields. It is necessary to investigate this irregularity.
15. Parasites are becoming increasingly important. They reduce the yield and quality of fruit and facilitate the development of secondary problems. These are found on many trees, especially those growing under poor management conditions. Control methods for these parasites have to be developed.
16. Plant yield and quality greatly depend on the farmer's appreciation of the effect of light, water, winds and soil on the different crops. Many of the crops are grown with little soil preparation at planting. They compete with intercrops for light and water and, in most cases, are without wind breaks.
17. Apart from the above, there are many other pests and diseases affecting fruit crops which are considered of minor importance. It is necessary to make an inventory of all pests and diseases of fruit crops grown in St. Lucia and evaluate their importance on the crop in question.

18. Although plant entry regulations exist in St. Lucia, they are not effectively enforced. Thus many pests and diseases of quarantine importance can be introduced and spread within the country. This is particularly important in the case of the citrus viruses. It is necessary to carry out an extensive search for citrus viruses and put in place a programme to ensure that only clean budwood enters or is distributed around the island.

CHAPTER VII: FARMERS ORGANIZATIONS IN ST. LUCIA

1. Farmer organizations are an important and dynamic force in the development of the agricultural sector in St. Lucia. While there are some 10,500 farms in St. Lucia, total membership in farmer organizations exceeds 15,000. Obviously, some farmers belong to more than one organization.
2. Although only 60 - 80 % of members may be active, St. Lucian farmers are organization oriented. At the present time (June 1986) the 15,000 members are associated with one or more of twelve (12) farmer organizations. Three of these are traditional organizations dating from the period 1939 - 1953 and dedicated to the exports of coconuts/copra, cocoa and bananas. Three others date from the eighties and produce poultry/eggs/pork for the domestic market. Five of the remaining six are relatively small organizations (22 to 70 members each) of recent origin and involved in providing basic services in the production and marketing of perishable produce. The final organization (NAFWA) is a facilitating organization and only indirectly involved in agriculture.
3. Seven of the twelve organizations earn foreign exchange for the country through their exports and two contribute significantly to import substitution of edible oil, poultry, eggs and pork.
4. None of the farmer organizations currently exports significant volumes of non-traditional tree crops although several of them recognize the potential for the production and marketing of tropical fruits once the marketing problems can be overcome.
5. The ingredients of success of farmer organizations are related to good management, effective facilitating services and a source of income. Without the first and last the organization will flounder over time and without the second the membership will dwindle and become inactive.
6. Seven farmer organizations either operate stores, or assist in other ways in the supply of farm inputs to their members. Other common facilitating services include information, training and technical assistance. Services offered by a few farmer organizations include credit and banana spraying
7. Marketing functions with which many existing farmer organizations have experience include grading, packaging, transportation, quality control and buying and selling. Other marketing functions of which only one organization has experience are meat processing and cooling/freezing.
8. The principal problems affecting traditional farmer commodity associations (CGA, SLAAL, SLBGA) tend to be of an operational nature, e. g. particular pests and diseases, low world prices, poor product quality, lack of

storage facilities, etc.. Management problems is not a bottleneck for these groups.

9. In the case of the younger and smaller groups (STAFCO-OP, Ti Rocher, Southwest, Mille Fleur and Bellevue) limited trained staff, insufficient investment and working capital, poor planning and coordination of production with marketing, inadequate supply of good quality planting materials, and most important of all, unreliable markets, are the principal constraints affecting the development of the farmer movement in St. Lucia.
10. With reference to anticipated problems, representatives of farmer organizations feel that increased exports of non-traditional fruits will be hindered by: unavailability of shipping at reasonable rates, unreliable markets and marketing agents, poor product quality, small volumes of production and lack of proper packing facilities.
11. Farmer organizations see potential for an increase in the production and export of tropical fruit and some are making plans for increasing the production and improving postharvest handling and marketing of horticultural crops. To overcome their felt problems they are seeking, and obtaining to a small degree, assistance from a wide variety of sources, including other farmers organizations, government, regional and international organizations.
12. The traditional farmers organizations in St. Lucia have proven that farmers will respond to price incentives and services and have the capacity to produce fruit in both quantity and quality, e.g. bananas.
13. Their experience demonstrates that development of farmers organizations requires time, consistent management and the generation and transfer of appropriate technologies and management ability.
14. The experience of the SLBGA indicates that field packing of fruit, with minimum investment in infrastructure, can be a practical and economic method in postharvest handling of perishable produce.
15. The experience of nontraditional farmer organizations, of relatively recent origin, also points out the ability of farmers to succeed on their own, if given support in key areas. Over the past five years, both private donor agencies and Government have contributed with training, information and technical assistance. These services have been instrumental in helping STAFCO-OP and its affiliates provide important services to members. Up to this point, STAFCO-OP has concentrated on the local market and import substitution with a great deal of success; however, as the organization grows and becomes involved with export commodities, it will need additional assistance in the following areas:
 - Information for planning and marketing.
 - Developing management capabilities in marketing.
 - Technical training in postharvest handling of perishable produce.
 - Training in the transfer of appropriate technology to members.
 - Identification and development of external markets.
 - Design and execution of infrastructure for postharvest handling.
 - Governmental control on imports which can be produced locally.
 - Credit to finance production and marketing activities.

CHAPTER VIII: DOMESTIC MARKET FOR FRUITS

1. The principal domestic markets for locally grown fruits are the public markets, supermarkets, hotels and restaurants, agroindustries and, to a small degree, the St. Lucia Marketing Board.
2. There are two significant public markets in St. Lucia: Vieux Fort and Castries. The former handles only a small fraction of the produce sold. The Castries market is "the" principal market of the nation. Both are weekend markets (Friday/Saturday) and relatively small volumes are retailed during the week.
3. The Castries Market is characterized by a large number of vendors, the majority being female members of farm families, retailing small amounts of a wide variety of produce under minimum conditions. Some 95 % of the covered area is dedicated to the retail of non-perishables, meat and fish, so that horticultural and food crops are relegated to the perimeter and streets surrounding the marketplace.
4. The lack of a covered area to protect produce from sun and rain and to facilitate presentation undoubtedly affects fruit quality in a negative manner and, consequently, consumers willingness to buy. Since the vast majority of the nation's production of fruits and food crops destined for the domestic market moves through the Castries Market, any improvement in food presentation would likely have a significant impact upon demand.
5. Most produce is transported by farmers from rural production sites to the Castries Market using their own small vans or public transportation. They tend to minimize their investments in packaging materials, i. e. using whatever type of box, sack or other container is readily available.
6. While farmers tend to harvest, transport and wholesale or retail their produce on the same day or from one day to the next, the permanent vendors will store their produce within the marketplace for several days. Persons wishing to leave their produce in the marketplace overnight pay a EC\$0.50 rental fee.
7. Only recently have efforts begun (CARDI) to systematically collect information on the quantities of produce moving through the Castries Public Market. Available information on market prices is of limited use since sales in the marketplace are made by the "pile" or "heap" and prices are reported by weight.
8. There are approximately 20 supermarkets in St. Lucia of which fewer than half retail tropical fruits. Of these, several cater to the expatriate and tourist trade and a large percentage of their perishable items are imported, e.g. apples, pears, grapes, carrots, cabbage, etc..
9. There are some 15 hotels in St. Lucia with approximately 3,500 beds of which 70 % are located in Castries. Occupancy is near 100 % during the winter season and may decline to near 50 % during the off season.
10. Reliable data on fresh produce purchases made by supermarkets and hotels is collected and published (St. Lucian Market Information) by MOA/CARDI. The hotels monitored represent 50 % of hotel beds in St. Lucia and super-

markets monitored represent 50-60 % of the supermarkets retailing perishable produce. Projecting these data, it can be estimated that supermarkets purchased 130 tonnes of locally grown tree fruits and hotels 225 tonnes, excluding bananas. These amounts are relatively small considering, for example, that one mature white grapefruit tree can produce one-half tonne of fruit.

11. Both supermarkets and hotels purchase fresh produce delivered by farmers directly to the respective establishments. When quality is poor the produce may be rejected; thus the better farmers soon learn to meet quality standards as set by the respective purchasing agents. Since these markets are limited and normally pay a better price, they are dominated by those farmers supplying consistently good quality produce or having well established personal relations with the buyers. In general, hotels and supermarkets report satisfaction with produce quality, except during the off season when it becomes a seller's market.
12. Supermarkets show little preference for particular cultivars of tropical fruit. Hotels, on-the-other-hand, will often specify seedless, pink flesh or especially juicy varieties of citrus, large mangoes or avocados with large seed cavities (an undesirable characteristic in the case of exports). Preferred characteristics will vary depending on the intended use of the product, e. g. salad, fruit cocktail, decorations, fresh whole fruit or other.
13. The St. Lucia Marketing Board (SLMB) employs 12 people and carries out three basic marketing functions: import, export and retail. Facilities are very limited and deficient; working capital is almost non existent. In 1984, total retail sales reached 60 tonnes of which 33 tonnes were tree crops, including bananas and bluggoe. Of these, 22.5 tonnes were purchased from farmers.
14. Total value of imports by the SLMB in 1984 and in 1985 were over EC\$500,000. In 1985, vegetables made up 46 % of these imports, temperate fruits 33 % and miscellaneous commodities the remaining 21 %.
15. In 1984 the SLMB exported mangoes and ginger for a value of EC\$316,432 of which the former accounted for only 3 %. In 1985 only ginger was exported with a total value of EC\$205,831.00.

CHAPTER IX: AGRO-PROCESSING IN ST. LUCIA

1. The processing of fresh fruits in St. Lucia takes place on a very small scale by relatively few firms which have been in operation less than five years. In St. Lucia there are four cottage industries and between ten and twenty home industries. One plant size operation is presently under construction in the Cul de Sac valley.
2. As many as eighteen different tropical fruits are processed by the six largest home and cottage industries in St. Lucia; volumes are very small, reaching a total of 26 tonnes processed by the industry in 1985. However, in 1984 one industry only (Agro Industries Ltd.) processed 355 tonnes of sliced mango in brine, of which 97% was the "long" cultivar. This fact

points out the potential market represented by the semi-processing of local fruit for export.

3. Given the small demand of this sector for fresh fruits (26 tonnes in 1985), supply is presently not a constraint and both quantity and quality of produce available is considered adequate. However, costs of raw materials are considered excessively high, making competition with imports very difficult.
4. Agro-processors give preference to particular varieties of a particular species, depending on the output desired. Fiber content, level of acidity, flesh colour and juice content are all factors taken into consideration in the selection of raw materials. Therefore, planning production for agro-processing is just as important as planning for export.
5. The eighteen processed fruits are transformed into more than thirty different products which are sold on the local market in very small amounts. Packaging materials are imported and tend to be very expensive and sometimes difficult to obtain. Limited working capital is often tied up in inventories.
6. High production costs and limited markets are major constraints affecting this industry. Although technology is available to produce quality products the high cost of local and imported raw materials and the lack of controls on imports makes local competition very difficult. On the export side, the identification of external markets and insufficient volumes of produce make market penetration difficult and all but impossible for the home and cottage type entrepreneur.
7. Physical facilities for the smaller enterprises are generally lacking; however, the small volumes handled would not seem to justify additional capital investment. The largest operation (Agro Industries) did not function in 1985 or 1986 for lack of a market for its output; thus excess capacity does exist. The overall industry is estimated to be operating at 60% of capacity.
8. Basic services (electricity, water, sewage, telephone) in the Castries area are adequate, but electricity and telephone services are deficient in some outlying areas (Canaries and Soufriere).
9. Equipment needs for home industries are met by household appliances and utensils; however, the agro-processors interested in increasing capacity or improving overall efficiency have difficulty in obtaining technical assistance and guidance as to what equipment to buy and alternative sources.
10. Small agro-processing industries represent a very low cost method of creating job opportunities. The six largest firms presently employ a total of thirteen permanent employees and twenty-five part-time labourers. In 1984, one firm (Agro Industries Ltd.) employed 54 persons during the mango season. If markets can be developed for home processed fruit products or semi-processed fruit for export a significant impact could be made in the job market.

11. Credit, under reasonable terms and conditions, is not readily accessible to small-scale agro-processing firms.
12. There seems to be a general lack of Governmental industrial standards and quality control mechanisms for both imported and domestically produced items.
13. The industry as a whole suffers from an irregular pricing policy on the local market. The same products may be found in three different stores at three different prices, some of which exceed the prices of imported brand names.
14. There exists a great deal of duplication of effort in the four Windward Islands in this area of agro-processing. The same product development activities are often carried out in the four Islands on the same product yielding the same results. Also, technical assistance tends to be island specific when the same consultant could be more effective using a sub-regional approach.

CHAPTER X: TRADE IN FRESH PRODUCE

1. Total value of fruit imports in 1984 was EC\$3.5 million. This amount was distributed between fruit products as follows: fresh tropical 1%, temperate fruits 14%, juices 68%, preserves 6%, jellies/marmalades 3%, dried 1%, and others 7%.
2. Significant amounts of temperate, processed and fruit juices are imported. These imports are likely to increase hand-in-hand with the tourist industry.
3. Governmental controls on imports, strengthening of the agro-processing sub-sector and promotion of locally produced fresh and processed fruits could lead to annual import substitution on the order of EC\$2.5 million.
4. Exports of produce other than UK destined bananas, while on the increase, are not very significant. These exports, in 1985, represented only 89% of the amount exported in 1976.
5. While grapefruit and avocado exports have increased four fold since 1976, total volumes exported in 1985 were relatively small (48 and 28 tonnes respectively). Only in the cases of breadfruit and plantains have volumes increased significantly over the 1976 amounts, reaching 912 and 445 tonnes respectively. These two commodities, between themselves, represented 55% of the volume of total fresh produce (non UK bananas) exports in 1985.
6. Significant declines in fresh produce exports have occurred since 1976 in the cases of coconuts, limes, mangoes, vegetables, ginger and ground provisions.
7. Although mango exports to regional markets dropped to near zero in 1985, because of the discovery of the existence of the mango seed weevil in St. Lucia, exports to the UK and Canada actually increased, resulting in a net gain over 1984 mango exports of 48 tonnes. However, 1985 mango exports was only 74% of 1976 mango exports.

8. Fresh produce exports from St. Lucia in 1985 were destined to a very few markets as follows:

<u>Market</u>	<u>Tonnes</u>	<u>% Total</u>
UK	1636	66
Canada	236	10
USA	22	1
Barbados	412	17
St. Croix	96	4
Trinidad	50	2
Others	17	1
	----	---
TOTAL	2469	100

9. St. Lucia does not have an organization of hucksters and their exact number is unknown. It is felt that there are fewer in 1986 than in 1984 due to the decline in the regional mango trade. An educated guess of their number would be in the vicinity of 100 - 200.
10. Hucksters exported 575 tonnes of fresh produce (23% of total exports) from St. Lucia in 1985 of which 72% went to Barbados, 17% to St. Croix, 9% to Trinidad and 2% to other regional markets.
11. The huckster trade is dynamic varying with seasons, economic conditions, plant quarantine controls and available transportation, among other factors. Mobility in and out of regional trade is relatively easy for the huckster as her principal capital investment is her time and accumulated knowledge.
12. The principal constraints to the huckster trade are the small scale of operations, lack of organizational structure as a group, lack of a quality and reliable transportation service, lack of packing and temporary storage space at the Castries wharf, and lack of organization for retailing and wholesaling in Barbados, Trinidad and St. Croix.
13. The SLMB only exported one crop in 1985. This amounted to 5,586 boxes of ginger valued at EC\$205,831.
14. Some 77% of 1985 exports of fresh produce from St. Lucia was destined to extra-regional markets. The bulk of these exports were made by five exporters who have been in business for less than six years and ship mainly to the UK (86%) and Canada (13%).
15. Extra-regional exporters tend to have some infrastructure for postharvest handling and vehicles for transporting produce. They usually have close friends, relatives or business partners located in the country of destination (U.K. or Canada) who handle operations at that end.
16. These exporters are usually supplied by 50 - 300 small and medium size growers. The principal export crops in 1985 were breadfruit (45%), mangoes (19%), and plantain (15%). Total extra-regional exports in 1985 amounted to 1,894 tonnes.

17. Principal constraints for extra-regional exports of fresh produce are the following:
 - Small scale of production and thus difficulty in assembling sufficient quantities of produce.
 - Lack of continuous supply of quality produce from the farmer.
 - Lack of financing for operating capital; the exporter buys for cash and sells on credit.
 - Transportation by air is expensive and space is limited; Geest lines, the main sea transport vehicles, are expensive and postharvest losses are high.
18. St. Lucia has relatively well developed port facilities. Hewanorra airport has a project underway for the construction of 8,400 sq ft of air cargo space. The only deficiency in infrastructure at Port Castries is that of a temporary storage/packing shed to facilitate the Huckster regional trade.
19. The Windward Islands Packaging Company Ltd., located at Vieux Fort, has the capacity to supply the sub-regions needs for quality cardboard cartons.
20. Sea transport to regional markets continues to be a limiting factor due to the limitations of the inter-island schooners. Although deficient, these schooners are providing a valuable service that can probably be improved upon as volumes of produce increase.
21. Containerized service to Florida via Tropical is available but remains unused. This line basically provides a one-way trade thus fees are very high.
22. Airline cargo service continues to grow at a slow rate and is a function mainly of the tourist industry.

CHAPTER XI: INSTITUTIONAL ANALYSIS

1. Outside the Ministry of Agriculture, Lands, Fisheries and Co-operatives, institutional units having an impact on the agricultural sector include:
 - The Central Planning Unit, Customs and Excise and the Statistical Section in the Ministry of Finance, Planning and Statistics;
 - The Trade Division, Industry Division and the Price Control and Supply Department in the Ministry of Trade, Industry and Tourism, and
 - Those sections dealing with roads, building construction, rural electricity and the maintenance of bridges, culverts and drains in the Ministry of Communications, Works and Transport.
2. The MOA is sub-divided into 18 units. Those having the most direct impact upon the production/marketing of tree crops are:
 - Extension Diversification and Advisory Services;
 - Research and Development;
 - Plant Propagation and Distribution;
 - Farm Management and Common Services;
 - Plant Protection and Quarantine, and
 - Agricultural Engineering.

Other divisions having an indirect impact are:

- The Statistical Unit;
- Forestry, and the
- Co-operative Division.

3. Of the 250 technical and clerical posts in the MOA in April 1986, 44% (110) were vacant. Of the 105 technical positions in the MOA, 31% were vacant in December of 1986. In a number of instances, very little effort is being made to fill the vacancies. There are, apart from the vacancies mentioned, a number of persons from the MOA on secondment to various institutions.
4. Total expenditure in the MOA for the financial year 1985-86 was \$5.4 million, excluding that spent in the Fisheries Section of the Ministry.
5. The Extension Division has been going through a period of transition. Whereas some extension officers had specialized in tree crop production under Phases I and II of the Orchard Crop Diversification Project this method of operation is no longer in effect. The methods used by the extension officers are individual farm visits, meetings with farmers' groups, demonstrations, and the media, especially radio. Of its 1985/86 budget of EC\$5.4 million, 24% was expended on extension.
6. The Research and Development Division is very weak at present because of the absence of sufficient trained personnel. Expenditures for this Division amounted to 7% of the MOA budget and included payment for development work in agro-processing and on the reduction of postharvest waste and of salaries for recently qualified agronomists who have been assisting other sections of the Ministry, namely the Plant Protection, Plant Propagation and Extension Divisions.
7. The Plant Propagation and Distribution Unit expended 9% of the MOA budget in 1985/86. Its activities included the propagation and sale of over 30,000 plants for which it collected some \$36,000 in revenue.
8. The Government Farms are the responsibility of the Farm Management and Common Services Division. Each of the three farms maintain small orchards from which fruits of excellent quality are sold to hucksters and other dealers at reasonable prices. Some 9% of the MOA budget was spent by this unit during the 1985-86 financial year.
9. Approximately 1% of the MOA budget went for expenses of the Plant Protection and Quarantine Unit during the past year. Apart from its principal quarantine activities the efforts of the Unit in 1985/86 were directed towards research into finding a means of controlling the Coconut Mite and carrying out surveys to determine the distribution and varietal preferences of the mango seed weevil.
10. The Agricultural Engineering Division is contributing, through its Land and Water Use Unit, to the growth of fruit tree crops by reclamation and proper drainage of fertile land in some areas; the division also provides irrigation equipment to farmers at low rates. Nearly \$379,000 (7%) was used by this section of the MOA in the performance of its numerous functions in 1985/86.

11. The Statistical Unit is producing a weekly marketing information newsletter (Prix Produit) and, through the provision of information regarding the availability of agricultural products in St. Lucia, helps the Ministry of Trade to regulate imports of products. Some 3% of the MOA budget is allocated to this Unit.
12. The Forestry Division received 21% of the MOA budget in 1985/86. Its major impact is in the protection and maintenance of the water reserves which are so necessary for plant and animal life.
13. The Co-operatives Division is understaffed and provides little more than a registrar service. It utilized 5% of the MOA budget in 1985/86.
14. The Government of St. Lucia plays a significant role in two quasi-governmental farms, namely St. Lucia Model Farms Ltd. and Dennery Farm Company. Both of these "farms" have valuable experiences in the production and/or marketing of tree crops which should be analyzed in detail for future tree crop activities in St. Lucia. St. Lucia Model Farms project anticipates the inclusion of 60 hillside farms of 10 to 15 acres each to be planted to mixed banana and fruit tree crops. The Dennery Farm Company, on the other hand, is an attempt to develop an efficient farming system, including the production of tree crops, on a large area of prime agricultural land.
15. At the present time the MOA is administering, or has just terminated, 10 different projects with external financing. Five of the projects relate to production. The Orchard Crop Diversification Project (BDD financed) ended its second Phase in 1985 and the government decided not to continue with Phase three. This project concentrated on the propagation and planting of fruit trees. Although somewhat successful in getting plants in the ground, plantings tend to be scattered and management practices poor. The other four projects which relate to production are: the Plant Propagation component of the Structural Adjustment project financed by USAID, the Drainage and Land Conservation project financed by EDF, the Young Farmer Training project financed by CIDA, and the regional Caribbean Agricultural Extension Project (CAEP) financed by USAID/UWI.
16. An important project with potential impact on production and marketing is the St. Lucia Small Farmers Agricultural Development Project (SFAD). It is oriented towards improving the health and welfare of low income farmers and is co-financed by CDB and IFAD. It is administered by MOA staff and has access to a line of credit administered by the SLDB. One of its goals is the establishment of two service centers which will supply farm inputs and assist in the marketing of fresh produce.
17. Other projects include two financed by the OAS and oriented towards research in solar drying and the processing of banana products. Two other projects are financed by FAO. One is to improve plant quarantine services and the second is a regional project to reduce postharvest losses of fruits and vegetables entering inter-island trade.
18. The principal lending and development oriented entities in St. Lucia are:
 - a) St. Lucia Development Bank (SLDB),
 - b) Commercial banks of which there are six,
 - c) Credit unions,
 - d) St. Lucia Mortgage Finance Company,

- e) Barclays Finance Corp. of the Leeward/Windward Islands,
- f) National Research and Development Foundation (NRDF), and
- g) General Finance Corporation.

19. The SLDB is the main institution providing credit for agricultural development, operating three lines:
- a) Farm improvement Credit,
 - b) Small Farmers Agricultural Development Project (S-FAD), and
 - c) Local CDB (FIC) line of credit.

The interest rate on all loans is 12% amortized.

20. During the period 1981-86, the SLDB approved loans totalling over EC\$20 million of which 17% were for agriculture. Of the EC\$16.1 actually disbursed, 13% went for agriculture.
21. Of the six commercial banks, only Barclays has an Agricultural Credit Scheme. In 1984, less than 4% of the value of loans granted by all commercial banks were oriented towards the agricultural sector.
22. There are 14 registered and functioning credit unions in St. Lucia. In April 1986, they had a total membership of 7,100 and a combined share capital of EC\$7,129,966. Total loans issued at this same date was 2,500 with a value of EC\$7,828,545. Six of the credit unions operate in agricultural communities.
23. To date, the NRDF has approved 50 loans valued at EC\$177,250. Two of these were agricultural in nature, one being for a plant nursery.
24. The other financing institutions do not provide loans to the agricultural sector.
25. The lack of sure markets for fruits means high risk, thus banks shy away from loans for tree crop production and farmers tend not to solicit loans of this type.



APPENDIX 4

CONCLUSIONS ST. VINCENT

CONCLUSIONS ST. VINCENT AND THE GRENADINES

The following conclusions have been summarized from the St. Vincent country report prepared by IICA during the period January - July 1986 and published as a separate document.

In the preparation of the original country document, the following persons made valuable contributions with information and/or special reports.

<u>Name</u>	<u>Subject Area</u>
Glenroy Brown	Natural resources, land use, farming systems, crop characteristics and cultural practices
Ernett Doyle	Plant propagation
Sylvester Lynch	Pests and diseases
Erica McIntosh	Agro-processing
Hugh Phillips	Institutional analysis
Samuel Scott	Farmer organizations and domestic marketing

The supervision, assembly and editing of the country report was the responsibility of: Jerry La Gra, marketing specialist and project coordinator, IICA Office in St. Lucia, and Rafael Marte, fruit production specialist, IICA Office in Barbados.

CONCLUSIONS ST. VINCENT AND THE GRENADINES

CHAPTER 1: NATURAL RESOURCE BASE

1. The rainfall pattern, as well as other climatic factors in St. Vincent and the Grenadines, is ideal for the successful growth of tropical fruit-tree crops. Rainfall ranges from 1,500 mm. near the coast to 3500 mm. per annum in the central mountains. There is a distinct wet season (May - December) during which most (70%) of the rain falls and a dry season (December - April) when rainfall is relatively low. Annual mean maximum temperature reaches 31 degrees C (87.8 degrees F) while annual mean minimum temperature descends to 24 degrees C (75.2 degrees F). Mean relativity humidity ranges between 70 and 75%.
2. Thunderstorms are frequent during the rainy season and may result in damage to tree crops. Even more disastrous are the hurricanes which, four times during the last century, have caused very serious damage. (1898, 1921, 1955, and 1980).
3. Three main physiographic regions are recognized viz: the northern, central and southern regions. These differ in age and topography, offering a variety of soil types and conditions for the growth of tree crops and other vegetation.
4. The St. Vincent soils are fertile; however, each group of soils has specific requirements if particular crops are to be grown and good management is necessary to provide these.
5. Sloping land is the rule rather than the exception. Fifty percent (50%) of the total land area is of greater than a 30 degree slope, including over 2,100 hectares of farmland.
6. Approximately 62% of the total land area in St. Vincent falls into land capability classes III, IV and V which, taking into account various factors such as slope, fertility, stoniness, potential for erosion etc., are best suited to the growing of permanent tree crops.

Government Controlled Lands

7. The Government of St. Vincent and the Grenadines is the largest owner of land in the country. In addition to Crown forest reserves and catchment areas, it owns seven estates the total area of which is 8,968 acres.
8. A large percentage of the Government owned estate lands is well suited to growing tree crops.
9. Of the Government owned/controlled estate lands, 36% (8,968 acres) has been leased or sold to farmers, 39% (Orange Hill) is soon to be distributed to small farmers, 20% is still under study or not clearly defined and 5% is, or will be, destined to be used for beef/dairy/poultry/winter vegetable production.

CHAPTER II: SOCIO-ECONOMIC CHARACTERISTICS OF THE SMALL FARMING SYSTEM

1. The small farm sector dominates agriculture in St. Vincent in all crop types. Common features are small farm size, multi-parcel holdings, multi-cropping systems and cash market orientation. Off-farm labour is undertaken as a means to maximize income.
2. Most farms are less than five acres in size and there is an increasing number of farms of less than one acre.
3. So as to spread risks and optimize returns, Vincentian farmers mix livestock and crop production. They combine as many as seven crops in a single enterprise and maximize land use vertically (multi-story mixes) as well as horizontally.
4. Data from the May 1986 census is not yet available (March 1987). However, the 1972-73 census showed that most farms were made up of two or more parcels and that 87% of the number of farms were two hectares or less in area and constituted only 23.5% of the total arable lands. In recent years, with the break-up of estates, there has been an increased parcelation of farm lands.
5. The 1972-73 census reported that 68% of the total number of holdings and 85% of the land area were owned lands. Of the balance (32% and 15%) rent free accounted for 13% and 4% respectively, cash rental (10% and 3%), mixed tenure (5% and 4%) and share tenancy (4% and 4%).
6. The main ethnic group making up the farm sector is of African descent. Small populations with East Indian, European (Portuguese and Scottish) and Carib (Black and Yellow) ancestry can be identified.
7. Women are almost as important as men in agriculture in terms of number employed, farm operators and unpaid family workers.
8. In 1972-73, 66% of farm operators were over 45 years of age but only 8% were over 55 years of age. It is thought that the average age of farmers has increased significantly in recent years.

CHAPTER III: CROP CHARACTERISTICS AND GROWING CONDITIONS

Cultivars, Harvest Seasons and Production

1. Julie, Ceylon and Imperial are the three most important selected mango cultivars grown in St. Vincent. The shipping quality of Julie is limited by the fact that it tends to ripen rapidly. Ceylon and Imperial are slower in ripening but more prone to anthracnose attack. There is a considerable number of named and unnamed seedling mangoes, but little information on them is available. These latter have very little market potential at present except maybe for processing. However, production of good quality mangoes may be significantly increased in a relatively short period of time by topworking these seedling mangoes with selected cultivars having high regional and extraregional demand.

2. Selected mangoes such as Julie, Imperial, Ceylon, Graham, and others, demand more intensive management than do the seedling mangoes. Therefore, both the extension agents and the farmers should be properly instructed as to how to manage them.
3. The mango season in St. Vincent extends from May to September, though limited production occurs before and after, with the peak of production in June - August. There is a gap between October and early April in which very few mangoes are available. Early and late high quality cultivars should be selected locally, regionally and extra-regionally and introduced into different locations for study of geographic performance, with a view to filling the production gap.
4. Phenological observations of mango cultivars currently growing at different locations in St. Vincent should be made, since they may behave differently in different microclimatic areas.
5. Breadfruit is a very important crop in St. Vincent; according to the 1972-73 Agricultural Census, 3,437 farms (57.6% of the total number) reported a production of 765,400 fruits from 16,075 trees. Rough estimates indicate that by 1990 production will be about 918,480 fruits representing some 2,050 tonnes.
6. Three types of breadfruit have been locally named: the cocoa bread, the common and the cashee bread. The cocoa bread, although having a high demand because of its large size and good quality fruit, is not as widely distributed as the common type.
7. One of the big constraints of this crop is the excessive height of the average tree, making harvesting difficult and cumbersome. There is a need for selection and characterization of the best clones, especially dwarf types, on which the propagation plans should be based, for future distribution and planting. Rehabilitation by pruning is also recommended.
8. A Germplasm bank of over 100 selections of breadfruit, including some dwarf types, exists and is managed by the Department of Agriculture of the Fiji islands. From this bank introductions could be made.
9. Normally, the breadfruit season in St. Vincent extends from April to late September, but, depending on environmental factors, some production may be obtained all year round. The common breadfruit comes into season early, followed by the coco bread and finally, the cashee. This last type has a shorter harvest season than the other two.
10. All sweet orange cultivars growing in St. Vincent are introduced. Valencia, Parson Brown, Pineapple and Washington Navel are the most important ones. While Valencia is considered to be a late cultivar, in St. Vincent, harvesting begins as early as June. Late clones of this cultivar should be identified and introduced.
11. Most fruits of W.Navel produced in this island are large and internally dry, a common problem when this cultivar is grown in the warm, low lands of the tropics. This cultivar should not be planted at less than 200m of altitude.

12. Marsh seedless. Thompson pink and Duncan are the most important cultivars of grapefruit, while the West Indian is the most popular lime in St. Vincent.
13. A wide range of types of sour sop, golden apple and other tropical exotic fruits is found in St. Vincent. No selections have been made, although scattered trees of excellent characteristics can be found. The genetic potential is there, waiting for the selection and characterization of the best clones, their massive propagation, distribution and planting.
14. Most avocados in St. Vincent are from volunteer West Indian type seedlings, but some selected avocados such as Lula, Simmonds and Pollock, have been introduced. Because of the diversity of sizes, shapes, skin colour and texture, width of the mesocarp, seed size and cavity, etc., local avocado seedlings have a very limited market. As with mangoes, they could be topworked with selected cultivars in high demand.
15. Currently, there is a big gap in the production of avocados from December to July as the normal harvest season for avocados extends from August to late October. Even though Lula is a late bearing cultivar, present production from newly planted trees is still insignificant. Other cultivars such as Semil 34, Hall, Gripina 5 and others, which have shown good adaptation to similar conditions in Dominica, Puerto Rico and Dominican Republic, should be introduced with a view to filling this production gap.
16. Reliable data on acreage and production of fruit trees in St. Vincent are unavailable. The 1972-73 agricultural census is probably the latest report giving accurate figures on some of these crops. New data should soon be available from the May 1986 census.

Growing Areas and Conditions

17. Approximately 70% of the mangoes growing in St. Vincent are found in the South and Southeast. These coastal regions under 500ft (152 m) receive an average of 85" (2,200 mm) of rainfall per year and are characterized by two to three months of marked dry season. These conditions are ideal for the production of West Indian mangoes, except that the amount of rainfall may be a factor contributing to the high incidence of anthracnose.
18. While breadfruits are widely distributed in St. Vincent (58% of the total number of farms have breadfruit), their susceptibility to wind and sea blast has minimized growth along the exposed East or windward coast. The best growing and productive trees are found in sheltered areas, such as valleys close to rivers, ravines or gullies, where moisture, deep soil and relatively cool conditions contribute to their growth and development.
19. All citrus species growing in St. Vincent are located in rainfall zones receiving 75"-100" (1,900-2,550 mm) per year, with a dry season from January to April. These regions are located between sea level and 3000 ft (914 m) of altitude. On the exposed East or windward coast, citrus is

rarely found at less than one-half to one mile from the coast. In these regions, windbreaks should be used to reduce the damage caused by high wind intensity (e.g. wind scar) and the high level of fruit drop. In the tropics, sweet oranges, mandarines and their hybrids attain best quality in the highlands while grapefruit, limes, and pummelos (shad-docks) prefer the warm low lands. Therefore, better distribution of species and cultivars by regions and microclimatic areas should be carried out (zoning) in St. Vincent, in order to obtain higher yields and better quality fruits.

20. Like most other fruit crops, soursop in St. Vincent is mainly cultivated as a backyard crop. Scattered plants are found anywhere but certain concentrations may be found in a concentric zone around the island (e.g. Three Rivers, Perservarance valley, Georgetown, Lowmans, Diamond, O'Brien, Dickson and Campden park), characterized by annual rainfall of 75"-100" (1,900-2,550 mm), well drained soils and sheltered areas.
21. Avocadoes are very susceptible to salty sea blast, high wind intensity and wet soil conditions. In St. Vincent, this crop is mainly grown in the protected, well drained areas of the inland valleys. Windbreaks are extremely important for this crop; however, very little use is made of them. Windbreaks will allow avocadoes to be planted in moderately open areas whose only constraint is the occasional high wind intensity.
22. Updated information about avocado production is practically unavailable but, according to the 1972-73 Agricultural Census, 14% of the farms in St. Vincent and the Grenadines reported growing this crop. As to location, 45% were on the Leeward coast, 36% in the south and 19% on the Windward side of the Island.
23. In St. Vincent, avocadoes are often found scattered but intercropped with annuals and other perennials. Young trees intercropped with bananas or plantains suffer excessive pruning, shading and herbicide drift. However, they benefit from the fertilizers and pest and disease control measures applied.
24. The Island of St. Vincent has ideal ecological conditions to produce quality fruits on commercial scale, including various species such as mango, avocado, orange, grapefruit, pummelo, limes, some mandarin hybrids and breadfruit. There is also good potential for some non-traditional exotic crops such as soursop, carambola, passion fruit, golden apple, sapodilla and papaya, for which there is a limited but growing market in the USA and Europe.

CHAPTER IV: PLANT PROPAGATION AND DISTRIBUTION

1. Most nurseries over produce certain species while not meeting the demand for others. The planning process for annual production targets by species and cultivars at the different nurseries needs to be improved. This process should be a function of farmer demand, combined with the consideration of governmental policies towards the development of the fruit subsector, and expectations for internal and external demand.

2. All nurseries need major repairs and new infrastructural work. All of them lack appropriate facilities such as soil shed, soil sterilizer, concrete floor, mist propagator, among others. The existing propagation sheds are in need of major repair and their present limited capacity should be expanded.
3. At most nurseries, especially Botanical Garden, the production of fruit, ornamental and vegetable plants are combined activities in that they share personnel, inputs and propagation facilities. Because of their nature, they should be separate actions. Otherwise, preference may be given to one over another, contributing to the production of plants of low quality.
4. The propagation techniques in use for certain species (e.g. mangoes) are obsolete and inefficient. They lead to a higher cost of production and facilitate contamination by certain diseases. New techniques to upgrade the overall propagation process should be introduced.
5. In spite of the fact that the sterilization of the propagation tools and the potting media are essential in the prevention of pests and diseases, none of the nurseries currently carry out this practice. This, combined with the practice of buying avocado seeds (which in the majority of cases have been in contact with soil) for use as rootstock, might be the reason for the low survival of avocado plants at most nurseries, especially at Wallilabou. This practice is known to be the most common way to introduce Root rot (*Phytophthora cinnamomi*) into the nursery and from there into the farms, contributing to the spread of this serious disease.
6. The nursery staff, both at the technical and non technical level, are in need of training in nursery management, propagation techniques, maintenance practices, pest and disease prevention and other practices. This will increase efficiency as well as improve the quality of the final products.
7. The poor sources of budwood is one of the more critical constraints affecting all nurseries in St. Vincent. The museums, in the few cases where they exist, are very limited and not well maintained. In fact, they might be the focus of infestation rather than a guarantee to produce healthy, high quality plants. The system for collecting and handling budwood may also lead to the contamination of the plants being produced. Organized Germplasm banks, including virus free plots, are needed. Because of the high cost of establishing and maintaining such a programme, this can best be achieved as a joint effort of the Windward Islands for the production and distribution of high quality plant material to its members.
8. Priority should be given to the production of adequate amounts of well formed plants of high quality, and not to quantity alone. The definition and enforcement of "Standards" as rules for the release of plants by the nurseries, help to avoid many problems that otherwise may be found affecting the plants in the field. These rules ("Standards") guarantee that the farmers will receive plants of high quality and in good condition.

CHAPTER V: CULTURAL PRACTICES

1. Land preparation for planting of fruit trees in St. Vincent is limited to manual clearing of virgin or secondary forest and the removal of weeds from the drip area where the plant is to be sown. This limited land preparation may delay the normal development of the tree and indirectly be responsible for a low rate of survival in young fruit plants.
2. Most fruit trees in St. Vincent are scattered in multiple cropping systems with other perennials and annual crops, especially bananas and plantains. Excessive shading and competition make trees grow slender and tall as well as making them more susceptible to attack by pests and diseases.
3. In some areas high wind intensity is a constraint to the production of good quality fruits. In some cases coconut leaves are used as temporary windbreaks to protect the newly transplanted trees. In general, very little use is made of permanent windbreaks.
4. Tree crops cultivated in pure stand orchards receive very little or no fertilizer. However, those intercropped with bananas and plantain, and possibly annual crops, benefit from fertilizers applied to these crops.
5. All tree crops and plantains grown in St. Vincent are rainfed. Yield is affected when there is a long dry spell, particularly in the drier regions of the island.
6. Weed control on tree crops other than coconuts is widely practiced, especially if they are intercropped with bananas. Both chemical (with Paraquat) and manual (cutlass and hoe) methods are used.
7. For some time, the Plant Protection Unit of the Ministry of Trade, Commerce and Agriculture carried out a spray programme for fruit trees but this service is now suspended for lack of funds. Currently, only fruit trees forming part of an intercropping system receive some marginal benefit from the spraying of the main crop.
8. While some pruning of fruit trees is carried out, a real knowledge of how and when to do it is lacking.
9. Technical assistance to farmers in proper cultural practices for growing tree crops is difficult to obtain. Extension agents tend to be crop generalists specialising in non tree crops. Training opportunities for extensionists are very limited, this limits their abilities to resolve problems affecting fruit crops in the field.

CHAPTER VI: BIOLOGICAL AND PHYSICAL FACTORS AFFECTING PRODUCTION/MARKETING

Pests and Diseases of Economic Importance

1. Sucking insects, e.g. scales, mealy bugs and mites, cause leaf deformation and destruction of tissues in leaves and twigs of mango, avocado and sour sop. There is also the accumulation of sap on the leaf and twig which encourages the development of sooty mould. As a result, yield is

reduced and fruit quality affected. These pests are widely distributed throughout the country. Control measures are being subsidised by Government in order to encourage farmers to carry out management practices. It is necessary to evaluate the efficiency of this spray programme. Since the subsidy will not be continuous, there is a need for the development of proper integrated control practices which farmers will execute on their own.

2. Birds make holes in the mango which later are invaded by rot-forming organisms. There is loss of quality both in terms of damage and of rotting of the fruit. Birds are found everywhere mangoes are grown. No control methods have been developed, nor has the degree of this problem been determined.
3. The banana borer (Cosmopolites sordidus) and plant parasite nematodes reduce plantain's ability to flourish properly. The pests are widely distributed especially since they are also pests of bananas. Control methods are the same as for bananas but need to be more widely used.
4. Anthracnose (Collectotrichum gloeosporioides) causes distortion of the leaves and spotting of leaves and fruit, loss of flowers and reduction of fruit setting in mangoes and avocados. In breadfruit, the disease appears on the fruit as brown and black spots which coalesce and penetrate into the fruit producing a condition known as 'sunburn'. This renders the fruit unattractive to the market and reduces its shelf-life. These problems are widely distributed especially during the wet season. Control methods for anthracnose in mango and avocado are available but it is necessary to integrate them into a complete management practice for the farmer. It is necessary to investigate anthracnose in breadfruit and to develop control methods and general management practices for the crop.
5. Many other pests and diseases not mentioned above affect fruit crops in St. Vincent. Although these pests and diseases are considered of minor importance, it is necessary to make an inventory of all pests and diseases of fruit crops grown and evaluate their relative importance.
6. In general, St. Vincent seems to be relatively free of pests and diseases of economic and quarantine significance. All the identified pests, diseases and weed problems can be controlled with good management, the lack of which can be considered a major constraint in St. Vincent.

Physical Factors

7. The yield and quality of fruits largely depend upon quantity of light, amount of water, wind velocity and type of soil. These factors affect the plant directly and create conditions under which other factors can have positive or negative effects. Best results are obtained when both planners and farmers understand these interrelationships and the impact on fruit production and quality.

Weeds

8. Weeds affect the yield of crops by competing for light, nutrients and water and acting as a secondary host for nematodes and other pests and

diseases. Weeds are present everywhere crops are cultivated and are a serious constraint to the development of young trees if not controlled. Control methods using herbicides are common and a wide range of herbicides is available. Attempts should be made to reduce the wide variety of herbicides used to minimize risks of improper use.

CHAPTER VII: FARMERS ORGANIZATIONS IN ST. VINCENT

1. There are two traditional farmers organizations in St. Vincent, one dating from 1930 (St. Vincent Arrowroot Industry Association) and the other dating from 1954 (St. Vincent Banana Growers Association). The former had sales of arrowroot in 1985 of EC\$1.3 million while the latter sold green bananas worth EC\$43 million to the U.K. Between the two, they employ 79 permanent staff and 416 occasional or day workers. While the membership for the Arrowroot Association is only 105, that of the Banana Growers is 4,719 active member/growers.
2. Another seven (non-traditional) farmers organizations have been formed in St. Vincent during the past decade. While ORD was established in 1976, the Chateaubelair Multi-purpose Co-operative Ltd. was only formed in 1986. The total membership of these seven non-traditional groups is approximately 3,000. Of these, ORD makes up 67%, National Farmers Union 26%, while the remaining 7% is distributed among the other five organizations.
3. Among the seven non-traditional farmers organizations, there is a wide diversity of interests and activities. The National Farmers Union is primarily a lobbying group to assist farmers in overcoming common problems by presenting a united front. Two groups, Rosehall Farmers Group and Rosehall Progressive Farmers Group, are more dedicated to agro-processing than production. Three others, Troumaca Independent Multi-purpose Co-op, Chateaubelair Multi-purpose Co-op and Chateaubelair Young Farmers Group, are in their incipient stage, with low memberships and very limited resources and management potential. The seventh group is the Organization for Rural Development (ORD) which, although young, has developed a very favorable track record.
4. ORD has been in operation for ten years, maintains a permanent staff of 31 persons and provides basic services which include: farm input supply, credit, extension, technical assistance in the production of cocoa, ginger and small animals, soil testing and management training.
5. ORD gives all the outward appearances of being a dynamic, progressive, grass-roots organization with considerable development potential. It receives financial and technical assistance, as well as moral support, from a myriad of donor agencies (PADF, USAID, CIDA, IAF, USDA, Peace Corps, IVS, and others).
6. ORD appears to be the only farmers organization in St. Vincent which could, at the present time, participate actively in a long range programme to grow and market tree crops for regional and extra-regional markets. It has already initiated activities to stimulate the production of cocoa and ginger among its membership for the export market.

7. An inherent danger is that ORD will be overcome with offers of resources for new projects from donor agencies. This could lead to over expansion and eventual weakening of a viable and important organization which seems to be having a favourable impact upon small farmers. Farmers organizations need to have their own source of income and should not become overly dependent on external assistance. ORD should concentrate on developing those priority services which farmers require to show economic gain.
8. None of the non-traditional farmers organizations has experience in exporting fresh produce, with the exception of ORD, which exported 105.5 tonnes of ginger, plantains and ground provisions valued at EC\$80,000 to the U.K. on Geest Lines in 1985. ORD is presently experimenting with shipments to Trinidad via the traditional huckster/trafficker trade and is interested in developing a Windward Island joint effort for regional and extra regional marketing.

CHAPTER VIII: DOMESTIC MARKET FOR FRUITS

1. The population of St. Vincent is approximately 110,000 with 26% living in Kingstown and its vicinity; the potential domestic market for fresh fruits is, therefore, quite limited to begin with.
2. Much of the population grows backyard fruits so that effective demand for fruits is reduced even further.
3. Of Kingstown's ten supermarkets, only the SVMB Supermarket sells fresh fruit in any significant volume.
4. The vast majority of fresh produce, including fruits, marketed in St. Vincent, moves through the public market of Kingstown. No quantitative data is available as to the amount, but it is many times over the combined amounts moving through supermarkets, hotels, restaurants and industries.
5. The Kingstown Public Market is more modern than public markets in neighbouring islands but less comfortable for the vendors. Market women prefer to retail outside where they can be closer to the flow of traffic, potential customers and where it is cooler. This market-place could be improved by some permanent shade facilities along the streets and in the open plazas and by improving ventilation inside the main market-place.
6. Information should be collected from hotels to determine the potential for expanding this market for the consumption of fresh tropical fruit, particularly those hotels in the Grenadines.
7. Purchases of fresh produce made by the SVMC in 1985 was 662.5 tonnes, of which 64% was purchased at its Kingstown buying station, 13% at Belmont, 12% at Chateaubelair and 11% at Louders. Of the type of crops purchased, 44% were tree crops (fruits), 16% were vegetables, 16% root crops, 6% legumes, 6% citrus and 12% miscellaneous crops. Of the tree crops purchased, 64% were coconuts, 14% mangoes, 12% citrus, 5% plantains, 3% cherries and 2% others.

8. Since SVMC exported 313.5 tonnes of fresh produce in 1985, approximately 349 tonnes, less postharvest losses, can be assumed to have been retailed through the SVMC Supermarket.

CHAPTER IX: AGRO-PROCESSING IN ST. VINCENT AND THE GRENADINES

1. The processing of fresh fruit in St. Vincent takes place on a very small scale, represented by the Cottage and Home Industries. Only one plant-size operation exists and that is at Orange Hill Estate. It came back into operation in January of 1986, after being closed for two years, and presently produces citrus and passion fruit juice for the local market.
2. Fifteen agro-processing instalations reported using 12 different types of raw materials including the following seven fruits: mango, plantain, guava, lime, passion fruit, orange and grapefruit.
3. The total volume of fresh fruit processed by all home and cottage industries in 1985 was less than 16 tonnes. This will increase in 1986 with Orange Hill in operation; however, this plant is not expected to process more than 3 tonnes of mangoes, 6 tonnes of grapefruit and 4 tonnes of other fruits in its first year of operation.
4. Some 14 different fruit products (juices, nectars, syrups, marmalades, jellies, jams, chutney and chips) are produced by the fifteen firms. Many firms produce the same type of product but with slightly different characteristics (quality, colour, package). In all cases, the output is small and is sold on the local market.
5. Raw materials are purchased locally from farmers or in the market-place. Other inputs such as sugar, glass jars, visk rings, covers, salt, etc. are imported. Some glass jars/bottles are recycled using new tops and covers.
6. Most of the agro-processing establishments are located in or near Kingstown although the largest, Orange Hill Estate, is located on the Northeast coast.
7. With respect to basic services, (roads, electricity, water, communications) the major constraints are the poor road conditions between farms and industries and the high cost of electricity.
8. While Orange Hill was orginally established as an agro-processing plant with heavy duty equipment, the other firms have established their businesses around existing structures, usually homes and household equipment. In some cases, e.g. Thel's and Aristocrisp, the owners have invested in separate buildings and some heavy duty equipment.
9. The technical level of the owners/operators of home and cottage industries is very low and has been obtained empirically. Only in the case of Orange Hill is there qualified technical expertise (micro-biologist consultant).
10. Capital investment in most home and cottage industries does not exceed EC\$10,000. At Orange Hill it may reach approximately EC\$100,000. Lack of

capital for the purchase of raw and packaging materials, which makes up 70% of operating costs, is a major constraint.

11. Orange Hill processes fruit grown on the Orange Hill Estate. Other processors use such small amounts that supply is not a problem. No storage or pre-processing of fruit is undertaken.
12. In the case of mangoes, varietal preference is shown by the processors depending on the output desired, e.g. Imperial or Julie for mango nectar and Paulover or Paradise for jam and jelly. For other fruits, where only jams/jellies are produced, price of raw material is the determining factor.
13. The high cost of packaging material (glass jars) and the dependence on imports and importers is one of the most serious constraints to the development of this industry.
14. All output is at present sold on the domestic market. There is some scope for increasing the volume of local sales but even if it were to double, the total amount sold would not be great. Thus, future growth must be oriented towards exports. This can take the form of: a) final output oriented towards ethnic or speciality markets, b) semi-processed fruits for extra-regional markets or, c) frozen fruits or fruit chunks for speciality markets.
15. Facilitating services to develop the home and cottage fruit processing enterprises in St. Vincent are not available from either the private or the public sector. The Produce Chemist Laboratory has been closed since 1984 but there is talk of reopening in 1987.

CHAPTER X: TRADE IN FRESH PRODUCE

1. The total value of imports (food and non-food) in 1985 slightly exceeded EC\$214 million. Fruit imports of all types was EC\$0.7 million. Of this latter amount, juices accounted for 49% of imports, temperate fruits 18%, preserves 9%, dried fruit 9%, marmalades/jams/jellies 6%, and others the remaining 9%.
2. Given the previous data, it seems as though the potential for import substitution is low and primarily in the area of fruit juices. A 100% import substitution in fruit juices and marmalades/jams would save of the order of EC\$400,000 annually.
3. Official statistics for fresh produce exports in 1985 show total exports of 48,818 tonnes, equivalent to an average of 939 tonnes per week. However, since many products are seasonal one could expect shipments to greatly exceed 1,000 tonnes during some weeks, if these data were correct. Since most of the shipments are made by sea from Kingstown in a few ships and since ship captains claim that total weekly cargo hauled is on the order of 350 to 500 tonnes, one must conclude that the official statistics for fresh produce exports are highly inflated. The main cause of this situation is the intentional over quantification by Hucksters, to facilitate getting foreign exchange in Trinidad. There is such a pressure of movement from the dozens of hucksters scurrying to get their produce

on board ship that the customs officials are unable to verify the amounts being shipped. Thus official export data from St. Vincent should be used with a great deal of caution.

4. Of the total volume of reported fresh produce exports in 1985, less than one percent was exported by ORD (105 tonnes), less than one percent by SVMC (313.5 tonnes), some 2% (897 tonnes) by the three principal private sector exporters and the remaining 97% (47047 tonnes) was exported by over 300 Hucksters/Traffickers.
5. Of the reported 1985 exports, 96% was destined for Trinidad, 1% for Barbados, 2% for the UK, <1% for Canada and <1% for other countries.
6. With respect to types of exports reported in 1985, 82% were ground provisions (eddoe, dasheen, tannia, sweet potato, yams), 16% were tree fruits (plantain, apples, avocados, coconuts, mangoes, non-UK bananas, others), one % was ginger and <1% were vegetables and legumes (pumpkin, christophene, others).
7. In respect to exports of tree crops in 1985, the volumes of the principal commodities were as follows:

<u>Tree Crop</u>	<u>Tonnes</u>	<u>Tree Crop</u>	<u>Tonnes</u>
Plantain	3,108	Breadfruit	94
Diverse apples	900	Lime	66
Avocados	854	Orange	62
Coconuts	832	Grapefruit	43
Mangoes	704	Soursop	34
Bananas (non-UK)	579	Other	740

8. The value of exports from St. Vincent has increased from EC\$15 million in 1975 to almost EC\$168 million in 1985. Of this 1985 value, food exports contributed 86% of which bananas represented 27% and other exports 59%. Even with the inflated 1985 statistics, it is obvious that fresh produce exports, mainly to Trinidad, represent a very significant portion of total exports.
9. Since St. Vincent does not have a modern airport for large international aircraft, only small amounts of fresh produce can be transported between the islands or air freighted to Barbados, St. Lucia, or Grenada for trans-shipment. Consequently, the vast majority of exports are made by sea from the Port of Kingstown.
10. An August 1985 technical report, (NOVAPORT), states that the present Kingstown port facilities are adequate (container yard area, schooner berths, banana storage shed) or marginal (deep water berthage, transit shed, general cargo outside storage) for the time being. It points out that future improvements will have to be made in the deep water berthage, general cargo outside storage, indoor storage for container cargo and office space.
11. At the present time only roll-on, roll-off containers are utilized, or 20 foot containers which can be off-loaded by ships crane. For the port to

function as container traffic increases, the Port Authority will have to obtain additional loading-unloading equipment.

12. The only cold storage facilities available in the port area are those owned and operated by the SVMC for imported frozen produce.
13. The principal constraint to the huckster trade in the port area is the lack of temporary storage facilities. This problem is to be resolved with a new short term storage facility to be financed by USAID and operated by the SVMB. Properly designed and managed, this facility could serve to upgrade product packaging and improve the quantification and control of exports. On the other hand, the introduction of a modern system with sophisticated equipment and methods, without an active participation of the Hucksters themselves, could easily result in failure. At the present time it is not to the Huckster's benefit to have their exports properly quantified, thus they can be expected to do everything within their means to keep a very exact or complicated system from functioning as planned.

CHAPTER XI: INSTITUTIONAL ANALYSIS

1. The Ministry of Trade, Industry and Agriculture is the main public sector body responsible for assisting and facilitating the production and marketing of fruit tree crops, as well as agriculture in general. Among its principal constraints which impact negatively on fruit tree crop (and all other crops as well) production and marketing are the following:
 - a) Trained manpower is in short supply and tends to be over-taxed with responsibilities; of 46 established technical positions (excluding forestry and fisheries) within the MOA, 4 are unfilled (January 1987).
 - b) The modus operandi of the Ministry tends to be one of "putting out fires". Available staff takes on problems on a day to day basis, attacking those highest on the list of priorities.
 - c) Decision making staff at the highest level is spread too thin and an excessive amount of their time is spent attending regional and international meetings, catering to foreign missions and administrative functions. Very little time is left for planning, and executing and monitoring agricultural development projects, e.g. the planning unit consists of one economist, one statistical officer, two field staff and one typist. Their main function is collecting statistical data.
 - d) With respect to tree crops per se, there exists no clear policy guidelines or strategy. Whatever activities are presently underway are a result of isolated actions/projects often promoted by donor agencies.
 - e) Financial resources are severely limited and insufficient to allow for continuous development in specific programme areas. This leads to a dependency on externally funded projects, which tends to exacerbate the situation, since the Ministry does not have the

absorptive capacity to properly manage projects, thus placing more administrative pressures on the already burdened staff.

- f) At the present time, the Ministry has underway, or in-pipeline, eleven externally funded projects which impinge directly or indirectly on tree crop production and/or marketing. Of these, only two (Cumberland Hydro Project and the Fruit Fly Survey) can be considered to be on schedule. The Mango Top Working, National Resource Management and Orange Hill Structural Adjustment projects are all behind schedule. While the USAID funded Agricultural Development Project terminates in September 1986, the other projects are just beginning or are in-pipeline.
- g) With this large number of projects to administer, there is little time for study, evaluation and follow-up. Projects terminate, reports are submitted, foreign experts leave and the nationals involved move on to the next project. Information and experiences are seldom analysed in detail and often, for all practical purposes, are lost. In some cases projects are initiated to obtain physical resources, e.g. vehicles, and then little follow up results.
- h) Institutional organization and management capabilities are weak and administrative support (equipment, secretaries, supplies) are deficient.
- i) Given the above situation, it is not surprising that this Ministry is unable to satisfy the farmers' and others' demand for services in the areas of information, propagation of plant materials, generation and transfer of technologies, soil conservation, plant protection, quarantine and others.
- j) For the future, this Ministry has three alternatives:
 - Continue with the present policy, knowing that the limited human and financial resources will not allow it to attain its goals and objectives.
 - Increase the manpower and financial resources to the necessary levels so that goals and objectives of the Ministry, and the externally funded projects, can be reached.
 - Reduce Ministerial activities, specializing in those areas (services) which available resources will allow Ministry staff to carry out efficiently, giving responsibility to the private sector to provide other basic services; for example, farmer organizations could be given more responsibility in areas such as propagation of plant material, transfer of technologies, administration of credit and technical assistance, direct involvement in marketing, etc.
- k) St. Vincent appears to have very favorable natural conditions for the execution of a tree crop production/marketing programme for extra-regional markets. The Ministry of Trade, Industry and Agriculture could be a pivotal institution in such a programme but it will have to be strengthened considerably for such a programme to be successful.

2. Institutional credit to facilitate tree crop production and marketing is at present not available through the principal sources of credit in St. Vincent: Development Corporation (DEVCO), Commercial banks, commodity associations or credit unions.
3. The Development Corporation is the institution most likely to be able to facilitate credit for tree crop production, either directly or in conjunction with farmer organizations, and most specifically in the integrated project for the development of Orange Hill Estate.
4. The Development Corporation is having problems with arrears and collection of outstanding debt. This, combined with established guidelines set by CDB and other sources of financing, puts interest rates charged by DEVCO nearly on par with rates charged by commercial banks, e.g. Farm Improvement Credit Scheme requires 10% for secured and 12% for unsecured loans while commercial bank rates tend to be between 11% and 15% depending on the type of loan.
5. The St. Vincent Marketing Corporation has excellent infrastructure for dry and cold storage as well as office space located at the Port of Kingstown. It is well situated to provide marketing services to the huckster trade as well as farmer organizations.
6. The SVMC is one of the very few institutions of this type in the region which runs at a profit. On total sales of EC\$18 million in 1985, net profits were of the order of EC\$1.8 million. Of this, some 80% was derived from commodity imports, 19% from supermarket operations and one percent from fresh produce exports.
7. Present services offered by SVMC include:
 - Imports of basic commodities (monopoly on sugar and rice) short term storage and distribution to wholesalers and retailers;
 - Supermarket retail services; and
 - Buying of farmers' produce at rural assembly points, postharvest handling and retailing of perishables in supermarket.
8. Other priority facilitating services which SVMC could provide might include:
 - Import of agricultural inputs for farmer organizations;
 - Import of packaging materials for agro-processing and exporters;
 - Short-term storage and quality control of fresh produce exports;
 - Technical assistance in postharvest handling and marketing;
 - Price and market information service; and
 - Cold storage rental service.
9. The SVMC, therefore, could play a very important role in a strategy for the production and marketing of tree crops. Here again, there is a need for a clear policy decision and functional delineation. The purpose for which SVMC was originally created seems to have grown less clear in recent times and suggestions for modification vary from closure to expansion into non-food related imports. There seems to be a feeling that the supermarket operation should be split off from the rest of the SVMC activities. There is a definite need for improved marketing facilitating services; these services should be defined and prioritized and SVMC should be reorganized to ensure that they are provided.



APPENDIX 5

TRADE STATISTICS DOMINICA



Table 1: Value (EC\$000) of Food and Non-Food Imports Dominica 1975-1985

ITEMS	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Section 0											
Food/live animal	14171	16622	16824	22335	15012	25695	29553	30011	27001	32388	28763
Meat and meat preparations	1995	2449	2980	4834	3143	4350	5817	5480	5682	7772	6537
Eggs and dairy products	1857	1876	2413	3647	2752	3903	5060	4450	4364	4370	4117
Fish crustaceans and preparations	1080	1637	1330	1597	1350	964	1605	1584	1450	1778	1850
Cereals & cereal preparations	3814	4262	5009	4909	3889	6605	7724	7810	7803	8371	8777
Vegetables and fruits	666	706	766	1257	716	1468	1484	1552	1274	1544	1717
- Vegetables	455	544	592	913	476	1086	1302	1263	1106	1283	1399
- Fruits	211	162	174	344	240	382	182	289	168	261	318
Sugar & sugar preparations	2433	3174	1586	2575	748	3988	3045	4740	1801	4010	1014
Coffee, cocoa and spices	437	409	405	702	354	902	642	493	598	472	488
Feeding stuff for animals	598	651	639	747	556	701	1003	1202	1169	971	1026
Miscellaneous edible products	1274	1384	1671	2056	1490	2620	3108	2655	2812	3056	3191
Section 1											
Beverages/Tobacco	1521	1560	2569	3189	3509	5076	4276	4088	3911	4757	5137
- Beverages	1365	1281	1976	2752	3164	4639	3860	3663	3514	4290	4652
- Tobacco	156	279	593	437	345	437	416	425	397	467	485
Oil seeds and oleaginous fruit	1	1	2	1	8	41	99	121	142	172	168
Sub-total (Section 0 + 1)	15693	18183	19395	25525	18529	30812	33928	34220	31054	37317	34068
Total Imports											
	45036	49832	59081	76770	59970	12873	13410	12819	1121710	156104	14937

Source: Central Statistics Office, Dominica
 Compiled by IICA, Office in St. Lucia

Table 2: Value (EC\$) of Imports of Fruits and Fruit Products by Dominica 1975 - 1985

ITEMS	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Fresh Fruits	826	1684	383	3704	2869	19320	1117	728	444	730	1038
Apples	10124	7247	0	15223	9131	32037	30350	11311	6586	15490	10500
Fresh Juice	94248	69083	50753	120937	136571	100456	37650	134545	40134	58444	49193
Jellies and Marmalades	9864	4925	4379	493	3882	31490	1461	5851	5639	9266	7786
Other Fruits And Nuts	66031	50471	79605	127471	71270	142726	65931	113212	79322	137942	190074
Fruit Preserves	10090	10662	7998	23918	1296	6379	10647	1458	2229	3061	6639
Dried Fruits	20322	18273	31010	52257	15148	49435	35087	22283	33292	36241	53056
Total	211505	162345	174128	344003	240167	301843	182243	289388	167646	261174	318286

Source: Central Statistics Office

Compiled by IICA, Office in St. Lucia

Table 3: Exports of Fresh Produce (excluding JK bananas) from Dominica by Commodity and Year, 1975-1985, tonnes

ITEMS	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Mango	165	175	209	172	95	47	26	98	77	154	178
Avocado	59	61	59	61	19	6	29	28	67	90	68
Grapefruit	3317	2517	2102	3484	1806	1378	1524	2653	2484	2344	2387
Orange	572	556	460	724	146	132	307	349	526	513	641
Lime	308	266	295	430	343	173	206	287	191	245	239
Plantain	710	589	495	538	273	140	224	310	502	622	645
Other Fruits*	2162	1997	2242	1211	1192	533	480	465	628	881	738
Sub-total fruits	7293	6161	5862	6620	3874	2409	2796	4110	4475	4769	4896
Vegetables	136	145	290	269	97	102	129	175	278	237	167
Ground provisions	586	602	560	475	218	177	361	339	586	740	499
Grand Total	8015	6908	6712	7364	3389	2688	3286	4624	5339	5746	5562

Source: Central Statistics Office.

Compiled by IICA, Office in St. Lucia.

* Other fruits include: Manderines & other citrus varieties, bananas (non U.K.), coconuts, pineapples, and other fruits not specified.

Table 4: Exports of Fresh Produce (excluding bananas to U.K.) by
Destination and by Quarter, 1984 & 1985, tonnes

DESTINATION	YEAR	QUARTERS				TOTAL
		1st	2nd	3rd	4th	
Regional:						
St. Kitts	1984	9.4	8.1	9.7	11.7	38.9
Nevis	1985	-	16.3	20.3	22.1	58.7
Anguilla						
Barbados	1984	51.2	117.4	43.1	77.4	289.1
	1985	151.0	179.9	99.7	94.3	524.9
U.S.V.I.	1984	42.9	42.3	67.7	66.9	219.8
	1985	50.4	42.9	38.0	48.3	179.6
Guadeloupe/ St. Marteen	1984	702.0	892.1	595.8	593.1	2783.0
	1985	672.8	661.3	606.5	568.8	2509.4
Other*	1984	153.5	478.8	437.2	549.2	1618.7
	1985	463.2	483.6	393.7	335.2	1675.7
Subtotal	1984	959.0	1538.7	1153.5	1298.3	4949.5
	1985	1337.4	1384.0	1158.2	1068.7	4948.3
Extra-regional:						
U.K.	1984	21.1	10.8	18.7	715.9	766.5
	1985	6.1	17.0	153.9	436.7	613.7
U.S.A.	1984	0.3	1.9	0.1	21.3	23.6
	1985	-	0.5	-	-	0.5
Canada	1984	0.3	-	-	-	0.3
	1985	-	-	-	-	0
Subtotal	1984	21.7	12.7	18.8	737.2	790.4
	1985	6.1	17.5	153.9	436.7	614.2
Total	1984	980.7	1551.4	1172.3	2035.5	5739.9
	1985	1343.5	1401.5	1312.1	1505.4	5562.5

Source: Central Statistics Office.

Compiled by IICA, Office in St. Lucia.

* Other: Trinidad & Tobago, Antigua & Barbuda, Martinique, B.V.I.,
Netherlands Antilles.

Table 5: Exports of Fresh Produce (excluding bananas to U.K.) by
Crop and by Quarters, 1984 & 1985, tonnes

TYPE OF COMMODITY	YEAR	QUARTERS				TOTAL
		1st	2nd	3rd	4th	
Fruits:						
Mango	1984	1.3	85.8	66.4	0.8	154.3
	1985	3.8	102.4	70.7	0.9	177.8
Avocado	1984	0.3	0.6	45.0	44.4	90.3
	1985	4.8	0.3	27.1	36.1	68.3
Grapefruit	1984	472.6	615.7	253.2	1002.2	2343.7
	1985	514.5	583.4	565.7	723.4	2387.0
Orange	1984	40.8	49.5	120.9	301.8	513.0
	1985	180.9	10.0	113.3	336.6	640.8
Lime	1984	78.1	90.5	42.1	34.5	245.2
	1985	82.0	98.2	33.7	25.0	238.9
Plantain	1984	99.3	215.2	175.8	132.0	622.3
	1985	149.1	188.1	184.4	123.6	645.2
Other fruits*	1984	86.2	201.7	190.8	315.7	794.4
	1985	218.8	230.3	155.5	133.6	738.2
Sub-total Fruits	1984	778.6	1259.0	894.2	1831.4	4763.2
	1985	1153.9	1212.7	1150.4	1379.2	4896.2
Vegetables	1984	52.5	80.7	53.3	50.3	236.8
	1985	52.3	52.9	37.1	24.9	167.2
G/provisions	1984	149.6	211.7	224.8	153.8	739.9
	1985	137.3	135.9	124.6	101.3	499.1
Grand Total	1984	980.7	1551.4	1172.3	2035.5	5739.9
	1985	1343.5	1401.5	1312.1	1505.4	5562.5

Source: Central Statistics Office.

Compiled by IICA, Office in St. Lucia.

* Other fruits include: Mandarines & other citrus varieties, bananas (non U.K.), coconuts, pineapples and other fruits not specified

Table 6: Quantity (tonnes) of Fresh Produce Exported from Dominica by Destination, 1985

Destinations	PRODUCTS										Total	
	Mango	Avocado	Grapefruit	Lime	Orange	Plantain	Coconut	Other Fruit	Sub-total Fruit	Bananas		Other Produce
Extra-Regional Destinations:												
Canada	-	-	-	-	-	-	-	-	-	-	-	0
U.K.	7	6	572	5	-	3	6	-	599	33163	14.7	33776.7
U.S.A.	-	-	-	-	-	-	-	-	-	-	0.5	0.5
Sub-total	7	6	572	5	-	3	6	-	599	33163	15.2	33777.2
Regional Destinations:												
Trinidad & Tobago	9	-	34	32	10	28	-	1	114	125	-	239
Antigua & Barbuda	52	26	46	21	76	180	0	3	404	240	-	644
St. Kitts/Nevis/Ang.	3	1	3	2	8	18	-	0	35	18	6	59
Barbados	34	1	183	24	77	87	2	1	409	103	13	525
Guadeloupe/St. Martin	27	21	1407	137	419	110	1	8	2130	38	341	2509
U.S.V.I.	10	2	7	6	6	8	0	12	51	42	87	180.6
B.V.I.	2	1	6	1	1	7	-	-	18	7	-	25
Martinique	0	0	92	8	16	1	0	0	117	0	0	117
Netherland Antilles	34	10	27	4	25	191	0	0	291	124	0	415
Monsterrat	-	1	10	0	2	12	0	0	25	6	0	31
Diverse	-	-	-	-	-	-	-	-	-	-	205	205
Sub-total	171	63	1815	235	640	642	3	25	3594	703	652	4949
GRAND TOTAL	178	69	2387	240	640	645	9	25	4193*	33866	667.2	38726.2

Source: Central Statistics Office.

Compiled by IICA, Office in St. Lucia.

* This amount plus banana exports within region (703) plus grand total other produce exports (667) yields 5563 which is the amount of total exports (excluding bananas to the UK) Table 5.

APPENDIX 6

TRADE STATISTICS GRENADA



Table 1: Value (EC\$000) of Imports into Grenada by Category of Imports 1974-1984

Items	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Food	15084	18256	21505	26017	31459	36099	39178	41413	41871	35406	42079
Beverages & Tobacco	1490	2003	2149	2603	3241	3564	4787	4160	3957	3310	3278
Crude materials (inedible) except fuel	1153	1276	2090	3580	3212	3853	5286	6004	7970	8437	5921
Mineral fuels, lubricants and related materials	3156	4344	5713	6995	7324	11817	17325	20783	20273	17251	17467
Animals and vegetable oils and fats	260	344	316	434	336	413	669	703	268	410	652
Chemicals	3504	6611	7330	8657	10114	11900	14856	15143	15293	12285	15848
Manufactured goods	6617	10445	13637	18176	16825	20367	20859	20810	25524	21073	22531
Machinery and transport equipment	2792	4270	6836	12387	14406	20435	18915	24921	22545	39217	29449
Misc. Manufactured Articles	3021	5075	6661	8430	9528	9529	13699	12769	14729	17090	13873
Misc. Transaction (N.C.S.)	4	2	11	6	7	1	-	1	-	2	5
Total Imports	37081	52626	66248	87285	96452	117978	135574	146707	152430	154481	151095

Source: Central Statistics.

Compiled by IICA, Office in St. Lucia.

Table 2: Value (EC\$) of Imports of Fruits and Fruit Products by Grenada 1975-1984

Items	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	%
Fruits (fresh)	110551	5373	31546	64515	26761	46608	128497	89931	83511	109364	18
Fruit jellies	109226	107748	182134	429597	562735	557751	732744	694364	485577	288614	46
Fruit temporary preserved and fruit preserved by freezing	609	1296	2257	59730	9993	22587	10202	914	46913	8118	1
Fruit preserved and fruit preparation	62139	48543	33415	104356	11283	5594	75495	19308	22641	66124	11
Others (preserved fruits)	36959	5120	70932	26406	49348	61397	35096	75619	17012	69574	10
Dried fruits	41909	38632	99583	1452	45331	137776	72351	61918	50625	65837	10
Jams, jellies, marmalades, fruit purees and paste of citrus fruit	15598	8793	-	-	23999	45822	24201	17737	30295	21927	4
Total	376991	215505	419867	686057	729450	877529	1074586	959791	736574	624558	100

Source: Central Statistics.

Compiled by IICA, Office in St. Lucia.

Table 3: Exports of Fresh Produce from Grenada 1978 - 1985, tonnes

Fruits	1978	1979	1980	1981	1982	1983	1984	1985
Fruits:								
Mangoes	20	488	445	362	485	619	371	567
Avocados	267	224	29	29	346	162	702	618
Grapefruits	-	-	-	-	-	-	106	35
Oranges	-	-	-	-	-	1	71	36
Limes	45	6	4	30	77	1	294	52
Plantains	72	222	111	474	110	541	802	1077
Breadfruits	-	-	-	-	-	-	-	13
Soursop	148	425	198	162	22	728	1006	914
Golden Apple	301	143	118	121	207	595	-	638
Paw Paw	26	20	19	53	8	45	62	97
Sapodilla	29	274	110	178	2	424	448	181
Tamarind	9	44	6	-	82	5	189	95
(Non U.K.)								
Green Bananas	50	178	70	9	49	354	842	1162
Dry Coconuts	2	215	349	241	2	319	100	4
Other Fruits	91	161	128	361	62	286	822	406
Sub-Total	1060	2400	1587	2020	1452	4079	5815	5895
Root Crops:								
Dasheen	-	44	40	74	41	150	91	70
Tannias	-	10	21	26	10	54	-	-
Yams	-	14	28	34	14	68	197	28
Sweet Potatoes	-	64	23	24	25	55	-	-
Eddoes	-	22	1	4	-	1	-	-
Sub-Total	-	154	112	162	90	328	288	98
Others:								
Pumpkins	65	9	15	10	-	11	9	71
Ginger	-	25	5	5	-	6	-	-
Misc.	-	26	9	14	1	7	-	-
TOTAL	1125	2614	1728	2211	1543	4431	6112	6064

Source: Official Statistics and Statistical Unit Ministry of Agriculture.
Compiled by IICA, Office in St. Lucia.

Table 4: Exports of Fresh Produce from Grenada by Month to Trinidad & Tobago 1984 (kgs)

PRODUCT	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JUL.	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
Mangoes	53363	142956	35739	35112	17757	16841	26212	20411	2812	14926	-	4545	370674
Avocados	759	-	-	2272	570	9470	151849	88645	201570	172040	73834	1146	702155
Grapefruit	9090	8181	9663	68181	-	-	-	-	-	-	-	11363	106478
Orange	1136	-	-	-	-	-	-	-	454	34090	34090	1136	70906
Lime	31818	129545	19545	15521	12409	2443	9039	10663	1750	44027	11363	6250	294373
Lemon	41818	21136	9387	6318	272	1136	-	-	-	-	-	2272	82339
Plantain	52272	140909	72727	54730	60487	70259	91668	41872	52055	88452	42575	33513	801519
Soursop	6160	65559	205000	124450	74172	93266	152735	46777	81171	27081	62038	67173	1005582
Green Bananas	83966	77272	38433	70330	42220	48795	99181	27608	58918	132784	85989	76083	841579
Plums	-	-	-	34345	68318	-	75909	55923	89536	72727	-	-	396758
Sugar Apple	-	-	-	-	-	-	-	3000	71318	22062	62304	7443	166127
Hanny Apple	-	-	2272	2272	-	454	-	-	-	-	-	-	4998
Sapodilla	13636	97954	92727	97232	64909	41388	10035	2665	272	-	-	27272	448090
Danson	10054	363	84545	11363	4545	16181	43363	448	909	-	-	-	171771
Dry Coconut	8409	4090	11363	21445	409	-	-	-	-	40727	13536	-	99979
Tamarind	79727	43409	724	24305	12500	20888	7272	-	-	-	-	-	188825
Other fruit	2272	-	-	5454	8181	5000	4545	6590	13636	2727	13636	-	62041
Sub-total	394480	731374	582125	573330	366749	326121	621828	304602	574401	651643	399635	238196	5764484
Pumpkin	454	2272	-	-	-	-	-	-	363	313	5909	-	9311
Dasheen	18181	-	-	18181	20454	4545	6931	4545	6818	6818	4545	-	91818
Yams	11818	17954	9000	2272	3636	5681	-	80000	39227	2272	9090	15909	196855
Total	424933	751600	591125	593783	390839	336347	678739	389147	620809	661046	418909	254105	6111382

Source: Statistical Unit, Ministry of Agriculture.

Compiled by IICA, Office in St. Lucia.

Table 5: Exports of Fresh Produce from Grenada by Month to Trinidad & Tobago 1985 (kgs)

PRODUCT	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JUL.	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
Mangoes	57755	56718	65440	116755	114150	66364	26471	6295	5152	39127	2727	9727	566681
Avocados	-	-	2084	2273	-	7273	87133	101714	180187	139063	81077	17563	618367
Grapefruit	1572	-	4091	-	-	5909	-	-	-	4545	14773	4318	35208
Orange	2273	4545	1818	4091	5000	-	-	2273	-	8636	4545	2955	36136
Lime	8006	2773	4527	273	4091	15227	4591	4909	1618	3027	682	2545	52269
Lemon	227	-	273	34091	1818	-	-	-	-	544	-	4715	41668
Breadfruit	-	-	-	-	-	-	-	-	8818	4182	-	-	13000
Plantain	43933	46920	7675	63376	101340	127480	75288	139194	169003	145003	76206	81993	1077411
Soursop	67444	98536	2591	113382	123241	85388	80041	24676	55659	88026	112319	62843	914146
Green Bananas	53918	43274	125989	54245	37336	100510	159865	78543	153586	181962	92389	80797	1162414
Plums	-	-	-	20455	9091	63636	5455	9091	5345	33069	11364	-	157506
Sugar Apple	-	-	-	-	-	-	-	-	7520	39955	32700	271	80446
Nanny Apple	-	-	1364	455	909	34091	909	3636	864	273	-	-	42501
Sapodilla	24545	31818	4389	31818	27273	6818	14076	2273	-	-	11364	21364	175735
Danson	-	4180	386	1500	40909	29545	6818	-	-	-	-	-	83338
Dry Coconut	455	136	273	586	155	1045	91	409	850	-	-	-	4000
Tamarind	2405	11818	1539	36909	26818	4082	9591	1591	591	-	-	-	95344
Pawpaw	-	-	-	-	-	-	-	-	-	-	-	-	99601
Golden Apple	-	-	-	-	-	-	-	-	-	-	-	-	638478
Other fruit	-	-	-	-	-	-	-	-	-	-	-	-	3336
Sub Total	262533	300718	222439	480209	492131	547368	470329	374604	589193	687412	440146	289091	5894588
Pumpkin	21436	27273	409	227	399	675	4479	227	10747	444	3540	1573	71429
Dasheen	-	-	273	4909	13264	491	682	12500	7364	25000	4545	909	69937
Yams	5409	10500	1295	2545	216	345	409	6818	500	-	-	227	28264
Grand Total	289378	338491	224416	487890	506010	548879	475899	394149	607804	712856	448231	291800	6064218

Source: Statistical Unit Ministry of Agriculture.
 Compiled by IICA, Office in St. Lucia.



APPENDIX 7

TRADE STATISTICS SAINT LUCIA



Table 1: Value (EC\$000) of Food Imports and Total Imports by St. Lucia, 1975 - 1985

ITEMS	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Section 0											
Food Imports	25064	30097	36157	45939	52092	60239	71081	67068	65317	66947	73487
-Meat and meat preparation	4841	6911	9215	11554	14443	13726	15610	16677	16767	18159	19132
-Eggs and Dairy products	2970	3966	4706	5789	7313	7698	10262	8808	8065	8344	8597
-Fish crustaceans and preparations	1493	1552	1834	2133	2640	2836	3221	2947	3204	3138	3403
-Cereals and preparations	6267	7845	7420	10780	11784	12590	16815	14754	16050	15909	19606
-Vegetables/fruit:	1794	2336	3811	4512	6046	8032	8194	7536	6837	7474	7837
. Vegetables	1121	1368	2230	2496	3252	3957	3877	3901	3631	3949	4183
. Fruits	674	968	1581	2016	2794	4076	4316	3635	3206	3526	3655
-Sugar	4021	3302	3422	4857	3429	8029	8220	7822	4508	4935	4641
-Coffee, cocoa spices	774	1081	1510	2021	2317	2035	2680	2132	2068	2011	2290
-Feeding stuff for animals	604	659	681	673	785	11205	1307	1436	1845	1766	1917
-Miscellaneous edible products	2300	2445	3558	3622	3335	4088	4750	4956	5972	5211	5891
Total Imports	100425	125708	160232	223469	273181	334162	348947	318737	288408	319997	337486
Food as % of total imports	25	24	23	21	19	18	20	21	23	21	22
Fruits/fruit products as % of food imports	3	3	4	4	5	7	6	5	5	5	5

Source: Annual Overseas Trade of Saint Lucia, 1978, 1980 and 1984, Statistical Department, Castries, St. Lucia.
 Compiled by IICA, Office in St. Lucia.

Table 2: Value (EC\$) of Imports of Fruits and Fruit Products, St. Lucia, 1975-1985

TYPE IMPORT	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	%
Fresh fruits	64720	77164	151512	30897	347885	313837	12911	9873	41182	48229	69216	1
Fruit juices	262618	453106	715718	1043688	1601986	2614568	3045447	2314064	2099850	2392731	2289528	68
Jellies and marmalades	40941	55529	111640	106111	122869	109343	138376	117379	116083	106980	113613	3
Others (nuts)	157503	229548	339522	439433	491415	656657	5129	304980	286561	237862	550885	7
Fruit preserves	50062	54613	102971	212462	18671	22537	743447	377156	237661	216913	83986	6
Dried fruit	5118	5995	77481	26130	28638	45614	66521	77597	65664	37245	63824	1
Temperate fruits	92785	92087	81882	157286	182797	312884	304586	432800	359054	484715	432355	14
Total	673755	968042	1580726	2016007	2794325	4075655	4316437	3634849	3206055	3525665	3603407*	100

Source: Annual Overseas Trade of Saint Lucia, 1978, 1980 and 1984, Statistical Department, Castries, St. Lucia.
Compiled by IICA, Office in St. Lucia.

* Total does not correspond to total in Table 1.

Table 3: Exports of Fresh Produce (excluding UK bananas) from St. Lucia by Commodity and Year, 1975-1985, tonnes

Fruits	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1985/1976
Mangoes	461.7	499.2	294.1	322.9	280.7	240.0	89.1	164.6	303.8	320.9	368.6	74
Avocados	4.6	7.2	6.2	4.3	7.4	1.1	0.6	-	4.6	6.7	28.3	400
G/fruit	10.1	12.0	9.9	20.2	45.5	54.7	20.0	43.2	34.8	46.3	48.4	400
Oranges	26.1	24.4	11.4	19.2	47.2	13.0	20.6	26.9	67.5	14.6	28.0	117
Limes	54.3	27.7	15.6	14.7	6.0	3.6	0.5	4.5	3.2	1.1	1.1	4
Soursop	-	-	-	-	-	-	-	-	-	9.2	43.2	
Plantain	225.6	185.7	11.0	250.9	143.0	100.6	185.4	108.7	169.8	461.5	445.3	241
B/fruit	184.0	227.3	377.2	458.2	723.5	458.7	624.9	444.2	267.6	603.7	911.7	400
Non UK												
Bananas	-	-	-	47.8	48.2	32.8	42.9	41.7	46.9	235.1	284.6	595
Coconuts	577.6	533.0	201.7	913.9	435.1	397.2	108.5	180.1	85.7	22.9	11.9	2
Other Fruit	17.3	31.4	4.2	2.2	2.3	2.1	-	0.3	0.2	4.3	28.0	90
Sub-total fruits	1561.3	1547.9	931.3	2054.3	1738.9	1303.8	1092.5	1014.2	984.1	1726.3	2199.1	142
Vegetables	161.0	277.6	170.1	135.5	38.5	14.6	14.7	17.0	15.3	6.2	40.4	14
Ground Provisions	252.5	193.7	187.5	112.8	74.8	77.9	70.3	38.5	50.7	73.4	115.4	59
Ginger	706.6	744.5	132.3	125.3	192.8	196.6	70.2	98.0	115.3	145.7	110.4	15
Total	2681.4	2763.7	1421.4	2427.9	2045.0	1592.9	1247.7	1167.7	1165.4	1951.6	2465.3	89

Source: Annual Overseas Trade of Saint Lucia, 1978, 1980 and 1984, Statistical Department, Castries, St. Lucia for the years 1975-1983; Prix Produit for the years 1984 and 1985.

Compiled by IICA, Office in St. Lucia.

Table 4: Exports of Fresh Produce (excluding bananas to the U.K.) from St. Lucia, by Commodity and Month, 1984 and 1985 (Tonnes)

PRODUCTS	YEAR	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	TOTAL
Mangoes	1984	0.2	1.8	7.6	6.8	63.1	104.5	61.2	58.7	11.3	5.6	-	0.1	320.9
	1985	0.1	-	1.0	8.8	10.0	44.3	129.8	95.7	35.8	39.5	3.6	-	368.6
Avocados	1984	-	-	-	-	-	-	0.1	1.9	4.7	-	-	-	6.7
	1985	-	-	-	-	-	-	0.5	5.1	12.3	9.3	1.0	0.1	28.3
G/fruit	1984	2.3	2.3	4.4	6.5	7.0	5.0	1.7	2.5	2.7	2.4	2.4	7.1	46.3
	1985	7.7	6.6	7.8	3.0	2.6	1.9	1.3	0.4	0.6	1.5	8.0	7.0	48.4
Oranges	1984	2.9	1.2	1.1	-	-	-	-	0.4	0.8	0.8	1.3	6.1	14.6
	1985	7.0	4.9	2.8	-	-	-	-	0.3	0.4	1.5	6.0	5.1	28.0
Limes	1984	-	-	-	-	-	0.3	0.3	0.4	-	-	-	0.1	1.1
	1985	-	0.2	0.2	-	-	0.1	0.1	0.3	0.2	-	-	-	1.1
B/fruit	1984	21.1	11.9	49.8	44.6	3.9	26.7	61.7	71.8	87.8	164.6	35.4	24.4	603.7
	1985	25.5	12.7	3.3	3.3	68.8	153.1	30.5	65.3	170.0	121.2	129.0	129.0	911.7
Plantain	1984	18.8	16.4	34.1	43.8	56.9	47.0	29.7	50.4	43.5	75.1	25.0	20.8	461.3
	1985	21.5	23.6	22.8	19.6	41.2	47.5	37.3	37.3	73.5	51.8	36.7	32.7	445.3
Soursop	1984	-	0.3	0.7	-	-	1.2	0.3	-	-	1.0	1.5	4.2	9.2
	1985	1.6	0.1	-	-	6.2	6.3	1.2	0.7	2.0	5.7	10.6	8.8	43.2
Coconuts *	1984	0.7	0.7	-	0.2	0.5	1.6	0.6	7.9	5.3	3.5	0.6	1.3	22.9
	1985	0.8	2.2	2.5	0.9	0.4	0.3	2.0	1.7	-	-	-	1.1	11.9
Bananas (non UK)	1984	13.1	23.0	26.0	9.0	16.0	24.0	10.9	14.0	22.1	28.0	22.0	27.0	235.1
	1985	30.4	39.0	25.4	28.8	31.4	14.7	-	8.9	26.9	11.0	40.7	27.4	284.6
Other Fruits **	1984	-	-	-	-	-	0.1	-	-	0.3	-	3.0	0.9	4.3
	1985	0.8	0.6	-	-	1.3	1.4	0.2	0.3	9.8	6.6	2.8	4.2	28.0
Subtotal fruits	1984	59.1	57.6	122.6	110.9	147.4	210.4	166.5	208.0	178.5	281.0	91.2	92.0	1726.3
	1985	95.4	89.9	65.8	64.4	161.9	269.6	202.9	216.0	331.5	248.1	238.4	215.4	2199.1
Ginger	1984	-	-	16.8	79.7	40.3	7.6	0.1	0.1	0.2	0.3	0.2	0.4	145.7
	1985	-	-	74.3	34.2	1.9	-	-	-	-	-	-	-	110.4
Vegetables ***	1984	0.2	0.4	0.2	0.3	-	0.5	-	0.1	-	-	0.7	3.8	6.2
	1985	7.7	7.0	3.2	3.1	2.3	1.8	0.6	0.8	1.7	3.6	4.5	4.1	40.4
Ground provisions	1984	14.3	10.0	10.0	6.7	10.6	5.0	2.1	3.2	3.4	5.9	0.3	1.9	73.4
	1985	2.8	12.0	9.5	10.7	7.2	10.6	11.2	8.5	12.3	15.4	8.9	6.3	115.4
Total	1984	73.6	68.0	149.6	197.6	198.3	223.5	168.7	211.4	182.1	287.2	92.4	98.1	1951.6
	1985	105.9	108.9	152.8	112.4	173.3	282.0	214.7	225.3	345.5	267.1	251.8	225.8	2465.3

Source: Prix Produit, Ministry of Agriculture Statistical Unit, Castries, St. Lucia. Compiled by IICA, Office St. Lucia.

* Coconuts, 2200 units = one tonne.

** Includes tamarind, paw paw, tangerine, plums, guava and golden apple

*** Pumpkin 65 % and okra 15 %, others 20 %

Table 5: Exports of Fresh Produce from St. Lucia (excluding bananas to the UK) by Country of Destination and Month
1984 and 1985 (Tonnes)

Destination	YEAR	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	TOTAL
Region:														
Anguilla	1984		2.0											2.0
	1985													0.0
Antigua	1984													0.0
	1985								0.1	0.2				0.3
Barbados	1984	31.3	36.7	63.7	57.1	66.2	102.7	59.6	45.6	46.7	52.7	45.1	56.8	664.1
	1985	63.1	60.9	42.7	40.7	36.3	28.4	10.7	19.2	38.6	19.4	32.7	19.4	412.1
Martinique	1984													0.0
	1985											0.1	2.0	2.1
St. Croix	1984	11.5	6.9	6.7	4.4		1.1	1.3		0.6			0.7	33.2
	1985		11.8	11.8	13.3	12.7	14.7	10.9	10.2	10.1				95.5
St. Thomas	1984													0.0
	1985												9.5	9.5
St. Martin	1984								1.5	1.3				2.8
	1985					3.1	0.9			0.2		0.2		4.4
Trinidad	1984													0.0
	1985											32.1	17.9	50.0
Subtotal region	1984	42.8	45.6	70.4	61.5	66.2	103.8	60.9	47.1	48.6	52.7	45.1	57.5	702.1
	1985	63.1	72.7	54.5	54.0	52.1	44.0	21.6	29.5	49.1	19.4	65.1	48.8	573.9
Extraregion:														
Canada	1984													0.0
	1985			1.4	0.7	16.5	34.5	61.0	21.1	32.7	27.8	21.3	18.5	235.5
U.K.	1984	30.7	22.5	80.3	136.2	132.1	119.5	106.3	157.9	129.4	229.1	46.1	40.5	1230.6
	1985	43.1	36.7	75.1	58.1	103.8	203.6	131.9	175.3	264.0	220.2	165.7	158.6	1636.1
U.S.A.	1984							1.5	6.7	4.5	6.1	1.3		20.1
	1985			21.2		0.9								22.1
Subtotal extrareg.	1984	30.7	22.5	80.3	136.2	132.1	119.5	107.8	164.6	133.9	235.2	47.4	40.5	1250.7
	1985	43.1	36.7	97.7	58.8	121.2	238.1	192.9	196.4	296.7	248.0	187.0	177.1	1893.7
GRAND TOTAL	1984	73.5	68.1	150.7	197.7	198.3	223.3	168.7	211.7	182.5	287.9	92.4	98.1	1952.8
	1985	106.2	109.4	152.2	112.8	173.3	282.1	214.5	225.9	345.8	267.4	252.1	225.9	2467.6

Source: Prix Produit, Ministry of Agriculture Statistical Unit, Castries, St. Lucia
Compiled by IICA, Office in St. Lucia.

Table 6: Fresh Produce Exports (excluding UK bananas) from St. Lucia by Destination and Commodity, 1985 (tonnes)

DESTINATION	Mango	Avocado	G.fruit	Lines	Oranges	B.fruit	Plantain	Soursop	Sub Total	Other produce	TOTAL EXPORTS	%
Extra-Regional:												
Canada	96.5	3.9			0.7	41.2	24.9	23.0	190.2	45.3	235.5	10
United Kingdom	270.2	24.7	5.4	0.6	4.0	805.1	263.3	18.9	1392.2	243.9	1636.1	66
U.S.A. (Miami)						0.9			0.9	21.2	22.1	1
Sub-total	366.7	28.6	5.4	0.6	4.7	847.2	288.2	41.9	1583.3	310.4	1893.7	77
Region:												
Antigua	0.07		0.04		0.4		0.3		0.9		0.9	
Barbados			39.4	0.4	22.4		138.1	0.3	200.6	211.6	412.2	17
St. Croix	0.03	0.05	1.6	0.2	0.5	15.4	11.4		29.2	66.4	95.6	4
St. Maarten	1.9						0.04		1.9	2.5	4.4	
St. Thomas										9.5	9.5	
Trinidad					0.03	1.0	0.4	1.0	2.4	47.6	50.0	2
Martinique			2.0						2.0	0.1	2.1	
Sub-total	2.0	0.05	43.04	0.6	23.33	16.4	150.24	1.3	237.0	337.7	574.7	23
Grand Total	368.7	28.65	48.44	1.2	28.03	863.6*	438.44*	43.2	1820.3	648.1	2468.4	100

Source: Annual Overseas Trade of Saint Lucia, Statistical Department, Castries, St. Lucia

Compiled by IICA, Office in St. Lucia.

* These totals do not tally exactly with Tables 3 and 4, data on products by destination and products by month and year are from two different sources.



APPENDIX 8

TRADE STATISTICS SAINT VINCENT



Table 1: Value (EC\$000) of Imports of Selected Food and Animal Products and Total Imports St. Vincent 1976 - 1985

DESCRIPTION	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Section 0:										
Food & live animals	19792	22973	31887	40434	46189	43165	48110	48348	50856	50433
-Live animals chiefly for food		60		93	80	80	237	124	132	120
-Meat & meat preparation		3317		5580	6383	6564	8614	8158	9734	10154
-Dairy/poultry products		2974		4320	4462	3773	3792	3582	3316	3379
-Fish & fish preparation		951		1244	1414	1677	1563	1372	1505	1522
-Cereals/cereal preps.		7202		17640	19816	18006	21357	22216	23993	22779
-Fruits & vegetables		1084		2178	2677	3161	2892	2803	2875	2699
-Sugar/sugar prep./honey		3630		3960	5606	3820	3392	3374	2212	2695
-Coffee/cocoa/tea/spices		841		1502	1402	1291	1717	1289	1275	1424
-Feeding stuff/animals		1012		1025	1031	876	52	42	35	30
-Misc. edible products		1901		2890	3319	3915	4495	5387	5779	5631
Section 1:										
Beverages and tobacco	3295	4162	5012	5812	7820	6841	7552	6852	7657	6282
-Beverages		3622		5186	7283	6141	6700	6107	6802	5340
-Tobacco		540		625	537	700	853	744	855	952
Section 2:										
Oil seeds/oleag. fruit				1	3	266	626	933	732	717
Section 4:										
Animal & Veg. oil/fats	45	53	75	187	255	144	357	378	362	51
Total Imports:										
Food and non-food	62020	81923	97690	125079	154178	157117	175818	189995	206804	214033

Source: Annual Overseas Trade Reports 1979-84; Computer printout 1985, Statistical Office, Min. of Finance, Planning and Development, Kingstown St. Vincent.
 Compiled by IICA, Office in St. Lucia.

Table 2: Value (EC\$) of Imports of Fruits and Fruit Products by St. Vincent
for Selected Years EC\$

DESCRIPTION OF TYPE FRUIT/NUTS IMPORTED	Value EC\$ 1965	Value EC\$ 1980	Value EC\$ 1985
Fresh citrus	8,430	-	87
Plantains	73	-	3,000
Pears	-	-	1,325
Apples	6,580	33,498	93,484
Grapes	3,543	4,678	29,829
Berries	-	4,908	2,536
Peanuts	3,554	247,402	43,905
Other nuts (edible)	3,040	5,289	20,658
Dried fruits	13,773	57,853	66,281
Preserves	8,945	66,263	63,796
	645	-	-
	2,827	-	-
Marmalades, jellies, jams etc.	5,931	-	42,687
Grape fruit juice	22,474	106,440	30,797
Orange juice	41,415	517,250	211,366
Other juice	15,378	257,837	62,989
Other fruits	-	114,648	46,862
TOTAL	136,608	1,416,066	719,602

Source: Annual Overseas Trade Reports 1965 & 1980; computer printout 1985,
Statistical Office, Ministry of Agriculture, Planning and
Development, Kingstown, St. Vincent.
Compiled by IICA, Office in St. Lucia.

Table 3: Exports of Fresh Produce (excluding UK bananas) from St. Vincent
by Commodity and Year 1979-1985, tonnes

PRODUCTS	1979	1980	1981	1982	1983	1984	1985
Tree Crops:							
Avocados	98.3	90.1	99.8	145.9	220.2	871.8	879.7
Bananas(non UK)	96.9	38.8	32.8	8.8	20.4	80.6	599.3
Coconuts	1856.0	1749.0	835.0	670.0	468.0	1774.0	809.0
Golden apples	N.A.	N.A.	147.1	185.3	455.0	346.8	962.1
Grapefruit	N.A.	N.A.	42.8	60.9	39.4	55.7	46.6
Mangoes	207.1	244.0	246.5	276.3	243.4	858.7	779.7
Limes	N.A.	N.A.	11.2	20.4	16.2	64.1	76.6
Lemons	N.A.	N.A.	0.8	0.4	0.3	1.8	3.1
Oranges	93.9	53.3	81.2	N.A.	N.A.	67.1	62.0
Plantain	928.7	874.2	1823.5	1785.3	1427.5	3049.2	3510.1
Subtotal	3280.9	3049.4	3320.7	3153.3	2890.4	7169.8	7728.2
Root Crops:							
Arrowroot	634.8	688.7	636.3	141.2	564.6	392.2	320.0
Casava	N.A.	N.A.	0.3	2.5	4.8	11.2	3.1
Dasheen >							
Eddoes >	1527.6	1976.2	3711.5	4892.0	8331.0	15967.8	23021.0
Peanuts	0.3	23.0	0.1	52.6	31.9	51.7	24.8
S. Potatoes	1155.8	1633.6	1095.9	952.2	942.0	2138.5	7738.3
Tannias	594.3	531.5	1397.3	1714.5	2685.6	6236.4	8486.7
Yams	348.6	257.2	406.7	633.7	1233.6	3884.9	2821.4
Yams	N.A.	N.A.	52.7	108.1	54.1	82.4	40.9
Subtotal	4261.4	5128.2	7300.8	8496.8	13847.6	28765.1	42456.2
Vegetables:							
Carrots	173.6	138.3	57.1	106.4	3.4	-	0.6
Peppers	N.A.	N.A.	5.8	4.7	6.7	9.7	3.9
Pumpkins	N.A.	N.A.	83.9	84.4	58.1	87.4	108.6
Subtotal*	173.6	138.3	146.8	195.5	68.2	97.1	113.1
Spices:							
Butneg	146.8	160.6	57.1	54.1	73.3	73.4	50.6
Ginger	526.5	435.4	98.9	123.2	167.1	255.3	328.4
Naco	26.2	24.8	9.2	7.2	16.7	20.2	33.2
Subtotal	699.5	620.8	165.2	184.5	257.1	348.9	412.2
GRAND TOTAL	8415.4	8936.7	10933.5	12030.1	17063.3	36380.9	50709.7

Source: Agricultural Statistics Unit MOTIA (Customs and Excise Dept; SVBGA; SVAA; WITC).

Compiled by IICA, Office in St. Lucia.

* Does not include watermelon, sweet peppers, eggplant exported under 1985 Winter Vegetable Project.

Table 4: Value (EC\$000) of Food Exports from St. Vincent by Category and by Year, 1975-1985

YEAR	Bananas to UK		Other Food		Total Food		Total Exports	
	Value EC	%	Value EC	%	Value EC	%	Value EC	%
1975	8925	58	5174	34	14099	92	15397	100
1976	14632	62	7800	33	22432	95	23673	100
1977	15107	61	8178	33	23285	94	24885	100
1978	19933	47	19386	46	39319	93	42100	100
1979	15884	42	16849	44	32733	86	38170	100
1980	16893	42	16666	41	33559	83	40262	100
1981	27149	43	23623	37	50772	80	63428	100
1982	24689	29	36072	43	60761	72	84826	100
1983	29760	28	43058	40	72818	68	106708	100
1984	31959	22	75432	53	107391	75	142138	100
1985	45067	27	99506	59	144573	86	167782	100

Source: Annual Overseas Trade Report (1979 & 1984), Statistical Office, Ministry of Finance, Planning & Development, Kingstown St. Vincent. Compiled by IICA, Office in St. Lucia.

Table 5: Exports of Fresh Produce (excluding bananas to the UK) from St. Vincent by country of Destination and month 1985, Tonnes

Destination	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total*
Regional:													
Trinidad:													
Tonnes	2712.5	2989.7	3899.5	4203.9	2293.6	1865.6	3111.2	3465.3	6023.7	4743.5	5732.7	5292.3	46333.5
%	98.8	98.7	98.7	98.8	98.1	96.9	97.6	98.1	99.0	99.1	96.8	99.0	98.4
Barbados:													
Tonnes	32.8	39.7	50.3	45.9	42.7	49.4	66.7	66.3	60.0	41.9	188.6	35.3	719.6
%	1.2	1.3	1.3	1.1	1.8	2.6	2.1	1.8	1.0	0.8	3.2	0.7	1.5
Others:													
Tonnes	0.0	0.0	0.0	6.1	1.5	10.0	9.5	2.0	0.2	1.9	2.0	16.9	50.1
%	0.0	0.0	0.0	0.1	0.1	0.5	0.3	0.1	-	0.1	-	0.3	0.1
Subtotal Region:													
Tonnes	2745.3	3029.4	3949.8	4255.9	2337.8	1925.0	3187.4	3533.6	6083.9	4787.3	5923.3	5344.5	47103.2
%	96.6	99.1	97.7	98.4	96.3	96.9	98.5	98.2	98.0	97.9	98.5	98.6	98.1
Extra- Regional:													
Canada:													
Tonnes	23.5	11.1	27.3	15.6	25.5	50.4	20.3	16.0	40.2	25.3	25.4	50.6	331.2
%	24.2	41.7	29.7	22.5	28.1	82.5	50.5	25.2	32.4	24.8	28.3	66.0	35.5
UK:													
Tonnes	73.6	15.5	64.6	53.6	65.3	10.7	19.9	47.5	84.0	76.7	64.3	21.8	595.5
%	75.8	58.3	70.3	77.5	71.9	17.5	49.5	74.8	67.6	75.2	71.7	28.4	64.0
Others:													
Tonnes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	4.3
%	-	-	-	-	-	-	-	-	-	-	-	5.6	0.5
Subtotal Extra-Regional:													
Tonnes	97.1	26.6	91.9	69.2	90.8	61.1	40.2	63.5	124.2	102.0	89.7	76.7	933.0
%	3.4	0.9	2.3	1.6	3.7	3.1	1.5	1.8	2.0	2.1	1.5	1.4	1.9
GRAND TOTAL:*													
Tonnes	2842.4	3056.0	4041.7	4325.1	2428.6	1986.1	3227.6	3597.1	6208.1	4889.3	6013.0	5421.2	48036.2
%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: "St. Vincent: A Market Profile" CARDI, St. Vincent, 1986, Tables Jan-Dec 1985, exports of selected commodities by destination (root crops, vegetables, legumes, tree crops, citrus, miscellaneous) livestock and livestock feed are not included.

Compiled by IICA, Office in St. Lucia.

* Numbers do not tally with Tables 3 and 7 due to difference in source.

Table 6: Exports of Produce (excluding bananas to the UK) from St. Vincent by Commodity and by Month, 1985, Tonnes

Products	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
TREE CROPS:													
Golden and Other Apples	26.8	3.7	4.1	2.9	6.3	9.1	9.5	23.1	92.4	113.1	338.1	271.3	900.4
Avocado	10.2	11.5	5.8	8.7	3.4	22.1	109.3	186.2	258.2	166.3	62.0	9.9	853.6
Banana	7.5	11.6	9.9	16.0	23.7	35.2	42.3	46.7	86.2	85.8	132.1	82.3	579.3
Breadfruit	6.6	4.5	4.0	1.1	10.4	7.9	5.7	5.6	7.8	13.5	10.7	15.7	93.5
Coconut	99.5	80.4	95.5	103.3	55.5	-	4.5	68.7	124.8	96.6	73.7	29.1	831.6
Mango	12.4	14.3	27.8	89.2	147.4	120.5	142.6	90.0	50.2	6.1	1.4	2.1	704.0
Plantain	208.1	220.1	231.2	265.1	238.7	25.0	314.7	290.9	371.0	309.1	354.7	279.7	3108.3
Soursop	2.2	2.2	1.7	5.3	5.2	5.2	2.1	0.7	1.7	0.6	5.2	2.0	34.1
Miscellaneous	0.5	0.3	0.7	0.9	0.4	0.5	0.7	2.5	9.2	8.3	3.6	693.1	720.7
Grapefruit	4.2	4.5	4.6	4.7	1.7	0.3	0.2	1.1	7.1	2.8	8.2	4.0	43.4
Lime	2.5	3.7	2.8	6.2	5.7	8.0	15.1	-	12.4	8.1	1.2	0.7	66.4
Orange	4.6	6.8	3.3	0.3	0.1	-	0.3	9.2	6.3	8.8	13.0	8.8	61.5
Tangerine	0.2	0.2	-	-	-	-	0.2	-	0.4	1.3	0.9	0.3	3.5
Dried Sorrel	-	-	-	-	-	-	-	-	-	-	-	16.2	16.2
Subtotal	385.3	363.8	391.4	503.7	498.5	233.8	647.2	724.7	1027.7	820.4	1004.8	1415.2	8016.5
ROOT CROPS:													
Dasheen	568.0	638.3	873.7	903.0	335.2	281.5	431.6	539.6	1013.6	747.6	1053.7	968.1	8353.9
Eddoe	747.7	845.7	1213.5	1316.3	762.5	644.0	925.8	1041.2	1864.8	1377.6	1611.2	1467.3	13817.6
S. Potato	111.9	185.1	195.1	234.4	266.6	417.6	642.6	754.4	1266.5	992.5	1242.7	1205.8	7515.2
Tannia	585.2	592.8	831.7	877.2	410.4	314.1	450.3	520.9	989.2	779.6	961.8	925.0	8238.2
Yam/assorted	379.4	427.8	490.7	460.3	134.7	62.7	99.9	0.1	-	130.2	81.7	54.7	2322.2
Subtotal	2392.2	2689.7	3604.7	3791.2	1909.4	1719.9	2550.2	2856.2	5134.1	4027.5	4951.1	4620.9	40247.1
VEGETABLES:													
Christophene	5.9	6.1	6.0	5.6	6.3	7.4	11.5	8.5	2.7	9.9	15.0	14.5	99.4
Egg plant	-	-	-	-	-	-	0.3	-	-	8.5	3.1	0.7	12.6
Pumpkin	12.7	13.3	7.2	8.4	5.8	7.1	4.8	5.5	4.7	6.5	10.9	15.5	102.4
Other	0.6	0.4	0.5	0.2	0.4	2.4	0.8	2.0	0.8	0.8	2.1	1.9	12.9
Subtotal	19.2	19.8	13.7	14.2	12.5	16.9	17.4	16.0	8.2	25.7	31.1	32.6	227.3
OTHERS:													
Legumes	0.8	0.6	0.0	6.2	0.0	0.2	0.0	0.0	0	0.8	0.7	17.0	26.3
Livestock	5.5	2.4	0.9	2.3	2.6	1.8	1.4	2.4	4.8	3.0	5.4	4.6	37.1
Livestock feed	324.0	256.0	249.0	0.0	515.0	346.0	390.0	259.0	262.0	395.4	300.0	354.0	3650.4
Farine	7.6	4.9	1.8	2.1	1.2	2.0	4.0	4.0	4.0	2.1	3.7	2.2	39.6
Ginger	36.9	116.1	30.2	7.8	5.7	8.9	7.9	5.5	24.5	12.9	20.4	25.3	302.1
GRAND TOTAL	3171.5	3453.3	4291.7	4327.5	2944.9	2329.5	3618.1	3867.8	6465.3	5287.8	6317.2	6471.8	52546.4

Source: "St. Vincent: A Market Profile", CARDI, Kingstown, St. Vincent, 1986.

Compiled by IICA, Office in St. Lucia.

Table 7-A: Quantity (tonnes) of Fresh Produce (excluding U.K. bananas) Exported from St. Vincent by Commodity and Regional Destination, 1985.

PRODUCTS	REGIONAL DESTINATIONS						Total Region
	Barbados	Guad/Marti	Guyana	Leewards*	Trinidad	Windwards	
Tree Crops:							
Avocados	2.5	-	-	0.1	873.2	-	875.8
Bananas(non UK)	0.7	-	-	2.2	593.6	-	596.5
Coconuts	68.0	-	-	-	368.0	-	436.0
Golden apple	1.9	0.1	-	-	945.2	-	947.2
Grapefruit	45.5	-	-	-	1.1	-	46.6
Mangoes	108.3	-	-	0.4	523.1	-	631.8
Limes	2.8	-	-	-	73.7	-	76.5
Lemons	-	-	-	-	3.1	-	3.1
Oranges	20.0	-	-	-	42.0	-	62.0
Plantains	225.3	1.4	-	3.5	3274.9	-	3505.1
Subtotal	475.0	1.5	-	6.2	6697.9	-	7180.6
Root Crops:							
Arrowroot	0.2	-	-	1.2	17.7	-	19.1
Cassava	-	-	-	-	2.7	-	2.7
Dasheen/Eddoes	83.7	0.7	-	4.8	22799.6	-	22888.8
Peanuts	-	-	16.6	-	2.1	6.1	24.8
Sweet Potatoes	24.8	4.1	-	8.8	7701.4	-	7739.1
Tannias	4.8	-	-	1.6	8472.6	-	8479.0
Yams	7.0	-	-	1.9	2810.6	-	2819.5
Farine	-	-	-	-	40.6	-	40.6
Subtotal	120.5	4.8	16.6	18.3	41847.3	6.1	42013.6
Vegetables:							
Carrots	-	0.3	-	0.2	-	-	0.5
Peppers	-	-	-	0.3	0.2	-	0.5
Pumpkins	12.4	0.2	-	0.4	37.9	-	50.9
Subtotal	12.4	0.5	-	0.9	38.1	-	51.9
Spices:							
Nutmeg	0.2	-	-	0.5	1.0	0.7	2.4
Ginger	16.0	0.5	-	0.8	142.8	-	160.1
Mace	-	-	-	-	5.9	-	5.9
Subtotal	16.2	0.5	-	1.3	149.7	0.7	168.4
TOTAL EXPORTS	624.1	7.3	16.6	26.7	48733.0	6.8	49414.5

Source: Computer printout, Office of Statistics Ministry of Finance, Planning and Development.

Compiled by IICA, Office in St. Lucia.

* Mainly St. Kitts and Antigua.

Table 7-B: Quantity (tonnes) of Fresh Produce (excluding UK banana) Exported from St. Vincent by Commodity and Extra Regional Destination and Total Exports, 1985.

PRODUCTS	EXTRA REGIONAL DESTINATIONS				TOTAL EXPORTS
	Canada	UK	USA	Total Extra Region	
Tree Crops:					
Avocados	3.1	0.8	-	3.9	879.7
Bananas(non UK)	2.8	-	-	2.8	599.3
Coconuts	-	377.0	-	377.0	812.0
Golden apple	14.4	0.5	-	14.9	962.1
Grapefruit	-	-	-	-	46.6
Mangoes	61.7	86.1	-	147.8	779.6
Limes	-	0.1	-	0.1	76.6
Lemons	-	-	-	-	3.1
Oranges	-	-	-	-	-
Plantains	4.3	0.8	-	5.1	3510.2
Sub Total	86.3	465.0	-	551.0	7732.2
Root Crops:					
Arrowroot	99.6	0.3	201.1	301.0	320.1
Cassava	0.4	-	-	0.4	3.1
Dasheen/Eddoes	77.8	54.5	-	132.3	23021.1
Peanuts	-	-	-	-	24.8
S. Potatoes	0.9	0.3	-	1.2	7740.3
Tannias	-	7.8	-	7.8	8486.8
Yams	1.5	0.3	-	1.8	2821.3
Farine	0.1	0.2	-	0.3	40.9
Subtotal	180.3	63.4	201.1	444.8	42458.4
Vegetables:					
Carrots	-	-	-	-	0.5
Peppers	3.3	0.1	-	3.4	3.9
Pumpkins	16.7	41.1	-	57.8	108.7
Subtotal	20.0	41.2	-	61.2	113.1
Spices:					
Nutmeg	13.9	34.4	-	48.3	50.7
Ginger	5.6	162.6	-	168.2	328.3
Mace	4.9	1.8	20.6	27.3	33.2
Subtotal	24.4	198.8	20.6	243.8	412.2
TOTAL EXPORTS	311.2	768.7	221.7	1300.8	50715.9

Source: Computer printout, Office of Statistics, Ministry of Finance, Planning and Development.

Compiled by IICA, Office in St. Lucia.

Table 7-C: Percent of Total Exports of Fresh Produce from St. Vincent
by Commodity and Destination

PRODUCTS	DESTINATION			Total
	Trinidad	Other within Region	Extraregion	
Tree Crops:				
Avocados	99.26	0.3	0.44	100
Bananas(non UK)	99.05	0.48	0.47	100
Coconuts (No.)	45.31	8.33	46.36	100
Golden apple	98.24	0.21	1.55	100
Grapefruit	2.36	97.64	--	100
Mangoes	67.10	13.94	18.96	100
Limes	96.21	3.79	--	100
Lemons	100.00	--	--	100
Plantains	93.30	6.55	0.15	100
Subtotal	91.70	5.75	2.55	100
Root Crops:				
Arrowroot	5.53	0.41	94.06	100
Cassava	87.10	--	12.90	100
Dasheen/Eddoes	99.04	0.39	0.57	100
Peanuts	8.47	91.53	--	100
S. Potatoes	99.50	0.48	0.02	100
Tannias	99.83	0.08	0.09	100
Yams	99.65	0.29	0.06	100
Farine	99.27	--	0.73	100
Subtotal	98.56	0.39	1.05	100
Vegetables:				
Carrots	--	100.00	--	100
Peppers	5.13	7.69	87.18	100
Pumpkins	34.87	11.96	53.17	100
Subtotal	33.69	12.20	54.11	100
Spices:				
Nutmeg	1.97	2.76	95.27	100
Ginger	43.50	5.27	51.23	100
Mace	17.77	--	82.23	100
Subtotal	36.32	4.53	59.15	100
TOTAL EXPORTS	96.95	1.20	1.85	100

Source: Calculation from previous tables
Compiled by IICA, Office in St. Lucia.

Table 8: Exports of Fresh Produce, excluding Bananas from UK, from St. Vincent by Commodity and Type of Exporter 1985

Type Commodity	SVNC		TRAFFICKERS		OTHER EXPORTERS		TOTAL	
	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes	%
Root Crops:								
- Tonnes	22.8	7.0	40092.1	85.0	132.4	3.0	40247.3	78.0
- %	0.1		99.5		0.4		100	
Tree Crops:								
- Tonnes	208.6	67.0	6438.5	14.0	485.9	11.0	7133.0	14.0
- %	2.9		90.3		6.8		100	
Citrus:								
- Tonnes	0.0	0.0	174.4	0.4	0.4	0.0	174.8	0.3
- %	0.0		99.8		0.2		100	
Vegetables:								
- Tonnes	22.6	7.0	151.4	0.3	53.2	1.0	227.2	0.4
- %	9.9		66.6		23.4		100	
Legumes:								
- Tonnes	22.7	7.0	2.1	0.0	1.4	0.0	26.2	0.1
- %	86.6		8.0		5.3		100	
Miscellaneous:								
- Tonnes	36.8	12.0	188.2	0.4	133.6	3.0	358.6	0.7
- %	10.3		52.5		37.3		100	
Livestock:								
- Tonnes	0.0	0.0	34.3	0.1	2.6	0.1	36.9	0.1
- %	0.0		93.0		7.0		100	
Feeds:								
- Tonnes	0.0	0.0	0.0	0.0	3560.4	82.0	3650.4	7.0
- %	0.0		0.0		100		100	
TOTAL:								
- Tonnes	313.5	100	47081.0	100	4459.9	100	51854.4	100
- %	0.6		90.8		8.6		100	

Source: Table constructed from data presented in "St. Vincent: A Market Profile" CARDI, St. Vincent 1986.

Compiled by IICA, Office in St. Lucia.

Note: Amounts exported by Traffickers are felt to be over stated

APPENDIX 9

BASIC INFORMATION ON FARMERS ORGANISATIONS

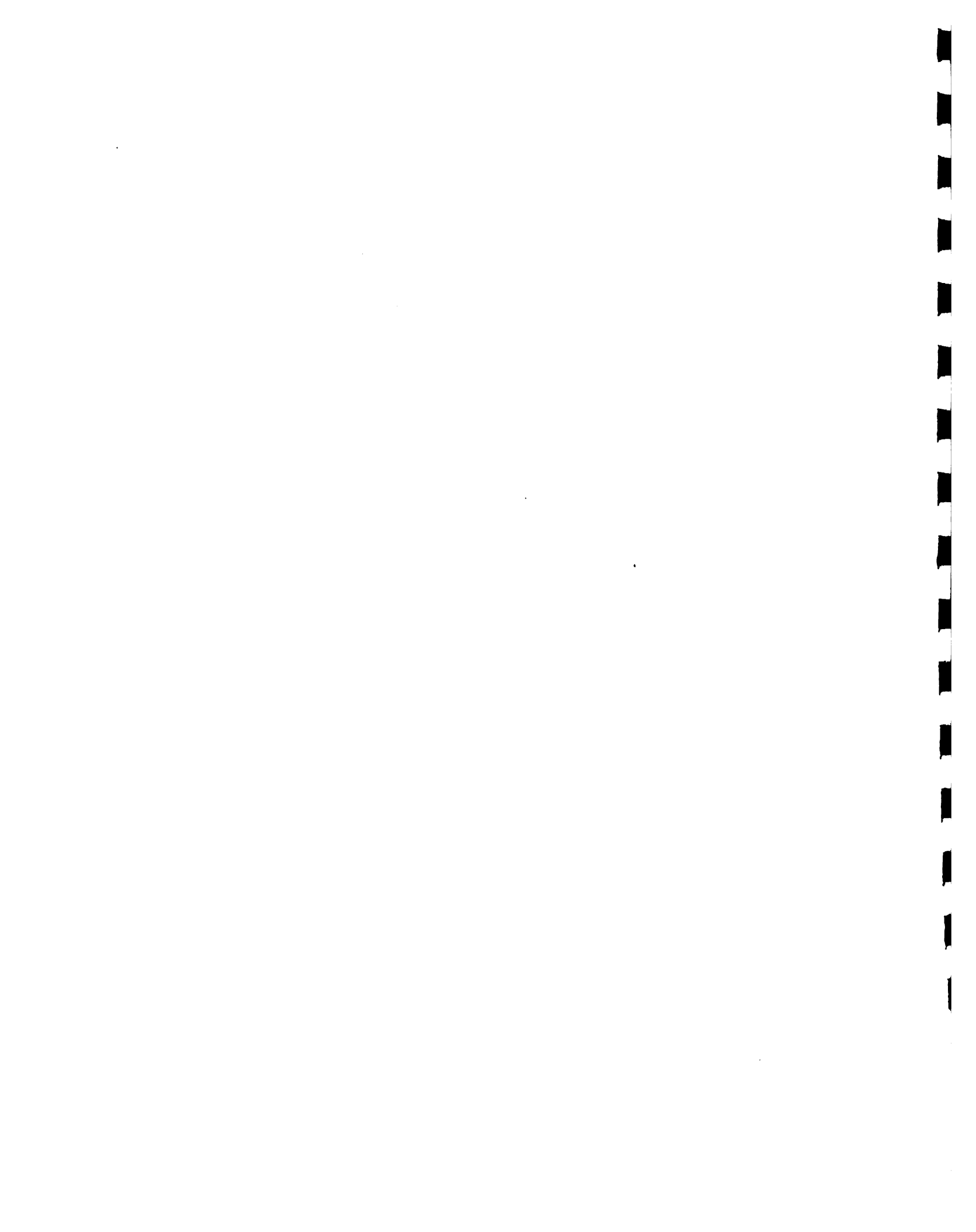


Table 1: Basic Information on Farmers Organisations in Dominica, 1986

Name of Organisation	Year Founded	Number Members	Principal Crops	Value of Sales (EC\$)	Services Offered	Assisting Agencies	Equipment/Infrastructure Owned
Dominica Banana Growers Association	1934	5,000	banana	(1)	Promote interests of growers; information; training	none	Office/furniture; one vehicle for field work; educational equipment, visual aids.
Cooperative Citrus Growers Association	1954	1,000	grapefruit, oranges, tangerines, limes	\$226,110 (1985)	Tool supply; production information; training; postharvest handling; marketing	CDB, CDF	Storage and processing facilities for 8000 cartons/day; 4 forklifts one vehicle.
Dominica Essential Oils & Spices Cooperative Society Ltd.	1968	450	bay oil	\$855,360 (1985)	Marketing of bay oil; advanced payments; storage; scholarships	none	Office & storage space; two stills; one vehicle.
Dominica Farmers Union	1972	1,500	none	\$12,000 (1985)	Agricultural supplies; inter pares, in-kind & ag. credit; promotion of interests of growers.	IAP, OXFAM, HIVOS	Uses rented space for office and supply outlet; one vehicle and office equipment.
Dominica Banana Marketing Corporation	1984	5,000(2)	banana	\$36.0 million (1985)	Input supply; information; training; spraying; transport; research; marketing.	CDB, WINBAN, BDD, EDP, EEC, CIDA, USAID	Rented office space; 2 input warehouses; 19 boxing plants; garage; 20 vehicles; spray plane; office equipment.
Eastern District Extension Central Committee	1984	350	plantain, dasheen	\$2,700 (1985)	Responds to specific problems; revolving loan fund; channels services.	CARDI, IICA, INRA, IPRA, TDRI, CIP, CYMMIT	Operates in mobile fashion with MOA support.
Dominica Credit Union League	1957	36,390	not applicable	0	Finance; insurance; training; promotion.	COC, USAID, VOCA	Administrative offices with training room.

In addition to the above there are over 50 organizations, associations and other primary groups of farmers, women and young men and women in the rural sector. These are distributed by Agricultural District as follows: Eastern 20 groups with 393 members; Northwester 11 groups with 346 members; Northeast 13 groups with 185 members; Southern 8 groups with 123 members, and Central one group with 11 members. Most of these groups have been in existence less than 7 years and have fewer than 30 members.

Source: IICA research.

Table 2: Basic Information on Farmers Organisations in Grenada, 1986

Name of Organisation	Year Founded	Number Members	Principal Crops	Value of Sales (EC\$)	Services Offered	Assisting Agencies	Equipment/Infrastructure Owned
Grenada Co-operative Nutmeg Association	1947	8,000	nutmeg, mace	\$12.5 million (1985)	Processing; storage; marketing	none	Office/furniture trucks/equipment 21 receiving stations 3 processing stations
Grenada Banana Co-operative Society	1954	1,100	banana	\$8.6 million (1985)	Input supply; credit; spraying; training; technical assistance; information; marketing transportation.	WINBAN, CDB, CARICON, USAID, EDF, GBRST	Office; garage; warehouse; 6 boxing plants; 15 jeep vehicles; one truck; spray equipment
Grenada Cocoa Association	1964	6,877	cocoa	\$12.2 million (1985)	Input supply; pest & disease control; transportation; processing; storage; marketing.	none	Office; warehouse; 3 fermentaries; 24 buying stations 5 trucks and 14 4-wheel drive vehicles
Minor Spices Co-operative Marketing Society	1971	2,600	cloves, cinnamon, pimento, tumeric, tonka beans	\$0.5 million (1984)	Grading; storage; marketing	none	Office; products are purchased at Nutmeg Associations' facilities
Young Workers Co-operative society	1975	5	cocoa, nutmeg, banana	small	none	ART, CARDATS	none
Productive Farmers Union (National Productive Farmers Union)	1980	800	none	\$35,000 (1983)	Training; T.A.; information; represent interests small/medium farmers; farm input supply;	ICRI, WOW, HIVOS, OXPAM,	Administration & supply centre in Grenville
United Workers Co-operative Agricultural Production Society	1981	5	vegetables, coconut, bananas, yams	\$12,000 (1985)	none	ART, CARDATS	none
Grenada Cane Farmers Association Ltd.	1984	107	sugarcane	0	Transportation; land preparation; training	HIVOS, CUSO, ART	none
Concord & New Hampshire Co-operative Marketing & Supply Centre	1984	200	vegetables & roots	n.a.	Farm input supply; marketing	ART, CERES, EDF, FRENCH	2 supply & purchase centres
Carinut Agricultural Production Co-op.	1985	7	peanuts, casava, tomatoes	small	Land preparation; training	ART, HIVOS	One tractor

Source: IICA research.

Table 3: Basic Information on Farmers Organisations in St. Lucia, 1987

Name of Organisation	Year Founded	Number Members	Principal Crops	Value of Sales(EC\$)	Services Offered	Assisting Agencies	Equipment/Infrastructure Owned
St. Lucia Coconut Growers Association	1939	2,600	copra	\$5.3 million (1984)	Input supply; quality control; transport; marketing.	none	Office; warehouse; Lister truck, office equipment.
St. Lucia Agriculturists Association Limited	1950	1,200	cocoa	\$305,845 (1983-84)	Input supply; training; credit; quality control; storage; marketing.	none	Operations centre; leases two warehouses; 10 acres of land; two vehicles.
St. Lucia Banana Growers Association	1953	10,000	bananas	\$61.6 million (1984)	Input supply; information; training; credit; T.A.; research; spraying; quality control; transport; marketing.	WINBAN, BDD, CDB, USAID, CIDA,	Offices; 3 warehouses; 13 buying depots; garage maintenance facilities; 22 vehicles and 2 aeroplanes.
St. Lucia Egg Producers Cooperative	1981	50	eggs	\$2.6 million (1985)	Input supply; information; training; T.A.; grade; pack; storage; chill; control; transport; marketing (2)	CARDI	All facilities are provided by STAPCO-OP.
St. Lucia Pig Producers Cooperative	1981	80	pork	\$68,879 (1984)	Input supply; information; training; T.A.; credit; grade; pack; control; storage; chill/ freeze; transport; market. (2)	CARDI	All facilities, processing, transport, etc. are operated by STAPCO-OP.
St. Lucia Association of Farmers Co-operative Limited	1982	four primary coops	eggs, broilers, pork	\$2.0 (1) million (1984)	Input supply; information; training; T.A.; grading; q. control; storage; processing; chilling; transport; marketing.	IVS, CUC, CBSO, IICA, CARDI	Two walkin chillers & 2 walkin freezers; feed/ equipment storage; wholesale/retail outlet; pork/ broiler processing equipment; two trucks.
Pi Rocher Farmers Cooperative	1983	35	foodcrops, pineapples, vegetables	\$25,000 (1985)	Input supply; information; training; research; social; mktg.	French, Caprican CIDA	Operations centre, store and storage depot.
Belle Poule Broiler Cooperative	1984	50	broiler chickens	\$42,500 (1985)	Input supply; information; training; tech. assistance; grading; packing; control; storage; process; chill; transport; marketing. (2)	CARDI	All infrastructure, processing equipment, vehicles, etc. are provided by STAPCO-OP.
National Farmers Welfare Association	1983	500	none	none	Technical assistance; Information; training.	none	none

Continuation Table 3: Basic Information on Farmers Organisations in St. Lucia

Name of Organisation	Year Founded	Number Members	Principal Crops	Value of Sales (EC\$)	Services Offered	Assisting Agencies	Equipment/Infrastructure Owned
Proposed Sunrise Harvest Fruit & Vegetable Producers Cooperative	1985	70	plantain, mangoes, avocados, foodcrops, (1985) flowers	\$41,000 (1985)	Input supply; information; research; grading/ packaging/quality control/transport; marketing.	CARDI	none
Mille Fleur Honey Producers Cooperative Society, Ltd.	1985	25	honey	n.a.	Incipient	POA	none
Bellevue Farmers Cooperative Society Limited	1986	26	vegetables, fruits, foodcrops (1985)	\$6,000 (1985)	Input supply; information; training; tech. assistance; grading/ control/transport/ marketing.	French	Input supply centre & receiving depot; sprayer; scales; measuring tools; one truck.

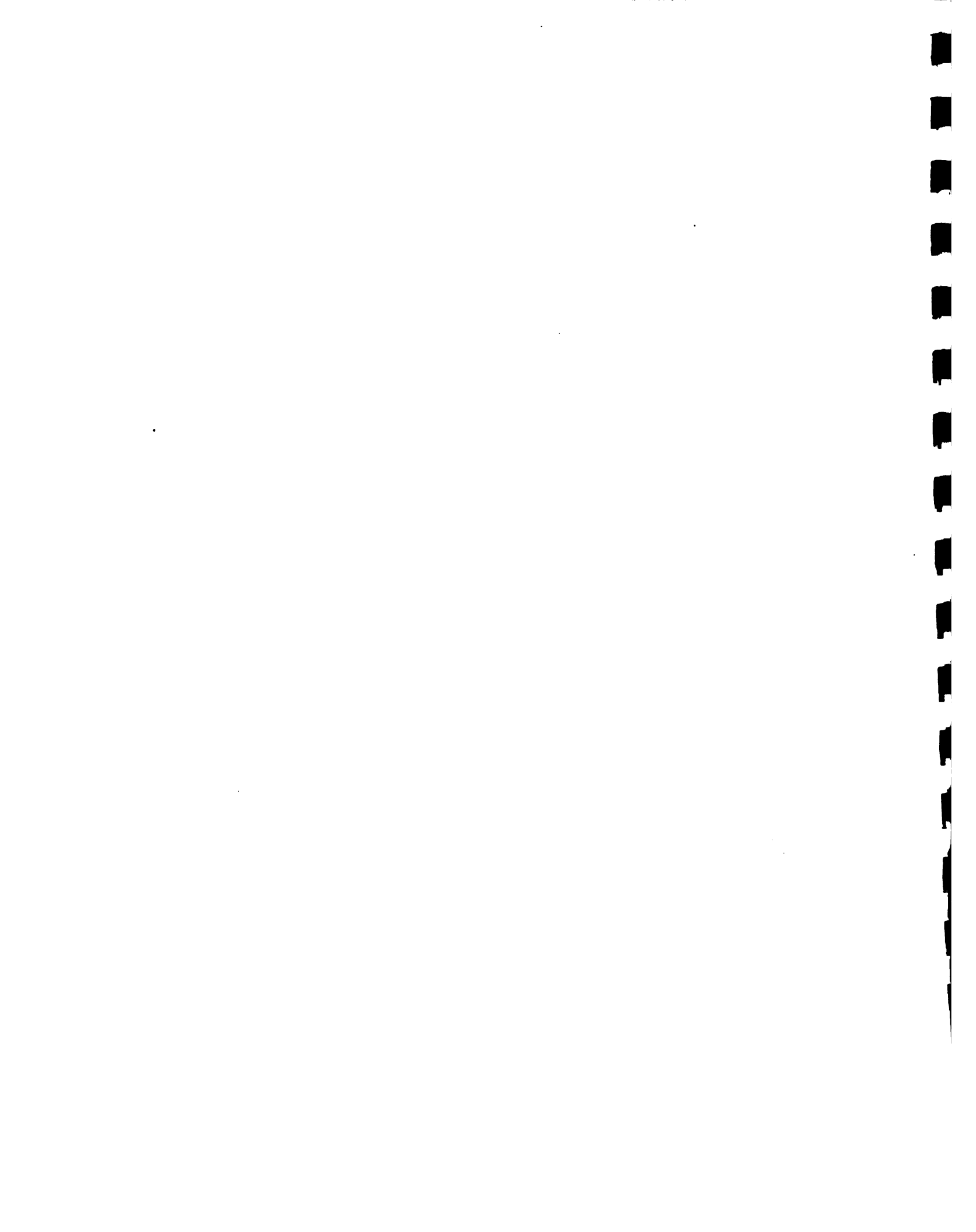
Source: IICA Research.

- (1) Sales include eggs, pork, broilers of member cooperatives and farm supplies.
- (2) Most of these services are offered through STAPCO-OP.

Table 4: Basic Information on Farmers Organisations in St. Vincent, 1986

Name of Organisation	Year Founded	Number Members	Principal Crops	Value of Sales(EC\$)	Services Offered	Assisting Agencies	Equipment/Infrastructure Owned
St. Vincent Arrowroot Industry Association	1930	105	arrowroot	\$1.2 million (1985)	In-kind credit; training; packaging materials; grading; transport; processing; marketing.	CARDI	Offices; 3 factories & main processing plant; store; storage for ag. inputs; one truck.
St. Vincent Banana Growers Association	1954	4,719	banana	\$43.0 million (1985)	Input supply; credit; spraying; training; technical assistance; information; research; grading; control; transport; marketing	WINBAN, CDB, CARICOM, USAID, EDP, BDD	Office; garage; government storehouse; 18 boxing plants; 5 jeeps; one truck; one tractor; one fork lift; 6 trailers; one aeroplane
Organization for Rural Development	1976	2,000	ginger, plantain, ground provisions	\$80,000 (1985)	Input supply; credit; technical assistance; soil testing; marketing.	Peace Corps, PADP, USAID, CIDA, IAP, USDA, IVS	Office & equipment; 70 ton storage/packing house; one truck; 3 jeeps one pick-up;
Rosehall Progressive Farmers Group	1979	48	ginger, pepper cinnamon, nutmeg, bananas, breadfruit	small	Milling corn; in-kind credit; training; supply fertilizer; storage/grading/processing/marketing	CARDI, CPWD, BCPFN French	18 x 12 foot building; corn sheller; multipurpose mill; heat sealer
Rosehall Farmers Group	1980	40	fruits, pepper	\$2,000 (1985)	Information; training processing; grading; marketing; farm inputs.	WARD, OXPAN, French, CCC	Office/processing centre; stove and utensils
National Farmers Union	1980	784	none	0	Training; in-kind credit; lobby for farmers interest.	CARDI, CARP, CIDA, NPUC, OXPAN, HIVOS	Meeting house; one jeep; office equipment; hand tiller; office rented.
Trounaca Independent Multi-Purpose Cooperative	1983	40	onions	\$2,000 (1985)	Input supply; credit; grading/drying/storage of onions; training.	CCC	Office is rented; Have some packing aids: scales, stapling, crates
Chateaubelair Multi-purpose Cooperative	1986	40	bananas	\$36,000 (1985)	Input supply; training; banana nursery.	ACDI, USAID	Farm input store; tractor.
Chateaubelair Young Farmers Group	1984	40	vegetables, bananas	0	Input supply, training	CARDI	Hand tools; brush cutter

Source: IICA research.



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