INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE
(IICA)

G R E N A D A

Appraisal of the Agricultural Sector for Policy and Project Identification

VOLUME I

CHAPTERS I - V

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FOREWORD

Late in 1986 the Government of Grenada requested IICA's assistance in the preparation of an Agricultural Sector Plan, noting that in spite of all the studies available and projects going on, and probably because of them, there was a need to take a comprehensive look at the secotr to determine the best path to follow.

During 1987, the Ministry of Agriculture followed with a particular request for the development of the livestock sector.

IICA responded through its Regional Projects Planning Unit coordinated by Gonzalo Estefanell by sending a team of professionals with wide experience in the Caribbean to develop a rapid assessment of the sector for project identification. The strategy used was to prepare guidelines for information before working closely with the Agricultural Planning Unit and to define national counterparts who would collaborate with IICA's team. This avoided a long and expansive 5 year development plan and took into account financial and resource considerations at the national level.

It should be considered as a sector-management tool since it helps programming actions and investment projects and provides the basis for monitoring implementation. Given its nature of speed and relative low cost, the idea is to repeat it say, every two years as a monitoring tool and to introduce the necessary changes into the programme.

The study was jointly conducted by IICA and the Ministry of Agriculture. The IICA team was coordinated by Gonzalo Estefanell, and composed of Rafael Marte, Hector Munoz, Jerry La Gra, Antonio Pinchinat, Irwin Telfer and Cosmos Joseph. The Grenadian team, coordinated by Ms. Monique Noel, Peter Radix, Kenneth Rush, David Mac Leish, Dennis Noel, and O. Benjamin.

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TABLE OF CONTENTS

LIST OF ACRONYMS

ART	Agency for Rural Transformation
BDD	British Development Division
CAEP	Caribbean Agricultural Extension Project
CARDATS	Caribbean Agricultural Rural Development and Advisory Training Services
CARDI	Caribbean Agricultural Research and Development Institute
CARICOM	Caribbean Common Market
CFTC	
CIDA	Canadian International Development Agency
EDF	European Development Fund
FAO	Food and Agriculture Organization of the United States
HIVOS	Dutch Cooperation Agency
IBRD	International Bank of Reconstruction and Development (World Bank)
IFAD	International Fund for Agricultual Development
IICA	Inter-American Institute for Cooperation on Agriculture
GDB	Grenada Development Bank
MAS	Mirabeau Agricultural Station
MFC	Model Farms Corporation
MNIB	Marketing and National Import Board
MOA	Ministry of Agriculture
NDF	National Development Foundation

OAS	Organization of American States
USAID	Agency for International Development (U.S.A)

INTRODUCTION

Traditional planning exercises demand a considerable amount of time and resources that small countries, such as those of the OECS cannot afford. The development of traditional 5-year plans require so much time that often are obsolete before they are completed. On the other hand, the execution of actions and projects without adequate organization and planning is also a serious error and usually leads to misuse of scarce resources as well.

Conscious of these problems, the Government of Grenada and IICA decided to undertake a comprehensive, albeit general, view of the Agricultural sector in order to determine the course of action for the next few years and, above all, identify investment projects within an overall strategy.

It is true that in Grenada, as in most of the Caribbean countries, studies abound but most of them only take a partial view, generally reflecting the needs of the funding agency for identifying investments in areas which are within their priorities. This document draws on most of the recent studies, including surveys and censuses and puts their findings in an overall frame and longer term perspective.

It should be pointed out that two areas that commonly are within the agricultural sector were not included in the study, they are forestry and fisheries. The former has been analysed by the FAO and is outside IICA's realm, the latter is not only outside the realm of IICA but also outside the mandate of the Minstry of Agriculture in Grenada.

The outcome of the exercise is a set of recommendations at the institutional level, statutory measures, commodity programmes and specific projects. All these, once prioritized need to be developed.

This type of instrument is seen as a continuous process for monitoring the agricultural sector. It is envisioned that this will be undertaken every two years to determine performance and to correct course, as conditions dictate. Of course, success in this endeavour depends on the close collaboration, and rapid reaction, of all parties interested in agricultural development of Grenada.

Gonzalo Estefanell
Coordinator, Regional
Projects Unit - IICA

EXECUTIVE SUMMARY

BACKGROUND

1. The economy of Grenada is facing several problems that can be summarized as follows:

    a. a large debt to be serviced
    b. an oversized civil service
    c. frequent cash flow problems
    d. production decline
    e. incapacity to generate sufficient foreign exchange to finance needs
    f. chronic deficit of current account
    g. chronically high unemployment (25%-30%)

2. Grenada is characterized, as is the case of the other OECS countries, by an extremely open economy, a very small local market to develop a self-sustained industrial development and, since it belongs to the OECS, with a common monetary authority, it cannot handle most of the macroeconomic variables being therefore left only with labour as the main tool for economic adjustment.

3. The main development goals defined for the 1986-1990 planning period are to achieve a real growth rate of 4%, control inflationary pressures, reduction of unemployment and to increase overall living standards while improving the distribution of income.

4. More specifically for the agricultural sector the goal is to revitalize and diversify it including livestock development.

MAIN CHARACTERISTICS OF THE AGRICULTURAL SECTOR

5. According to the land use study finished in 1982 there are some 38 thousand acres of arable land in Grenada, of which 34 thousand are in slopes of more than 10 o. There are at least fourteen distinct soil types but four of these predominate. Of these, three are of medium fertility and internally well drained but, because of the slope problem, before recommending any development each location has to be evaluated.

6. According to the 1981 Agricultural Census there were at the time 8200 farmers in Grenada, equally divided between part-time and full-time farmers. The overriding characteristic of all of them is the relatively small size of the holdings: 49% were farming between 1 and 5 acres. Performance of part-timers seems to be positively correlated with the size of the holding, which would support the contention that current acreages are insufficient to support a family adequately.

7. Land distribution is skewed. 10% of farmers, who occupy

holdings in the range of 5-25 acres, control 24% of land, whilst 88% of small farmers, with holdings of less than 5 acres in size control almost as much.

8. From information at hand, it can be assumed that full-timers are chronically under-employed and, within the current structure, little room exists for reducing the 31% unemployment rate estimated for the economy as a whole, within the agricultural sector.

9. The main constraints found are listed below:

   a. Smallness of the internal market precludes the commercial supply of inputs adequate to the different types of production other than the traditional export crops.

   b. Relatively high acreage of agricultural land not being utilized. Apparently because of low returns to agriculture, land with potential for production is being left idle or is being devoted to non-agricultural use.

   c. Low net income of farmers. In a study carried out by CARDI in 1981/82 it was found that, on average, small farmers' net return for a year was even less than that of an agricultural labourer.

   d. Low agricultural labour income relative to other sectors of the economy. According to information from the population census, the average earnings of an agricultural labourer is half of the average earning of a labourer working in other sectors of the economy.

   e. Because of the above, and due to the seasonality of demand for labour in the Agricultural sector, there is a shortage of supply of labour in spite of the high unemployment rates.

   f. High age of the agricultural population. It is said that older farmers are less willing to undertake risk, utilize credit or introduce technological innovations. All these characteristics tend to retard the development of the sub-sector.

   g. Small size and fragmentation of holdings, along with the ruggedness of the terrain. This aspect is preventing the introduction of technology and makes it very difficult to deliver services and inputs.

   h. There is low institutional capability for generating and disseminating information for decision making. This is lacking at all levels of the agricultural sector, from the Ministry of Agriculture to specific projects, to the Marketing Board, farmers organizations

and at the farm level.

i. Production losses due to poor management of pest and disease problems, as well as poor post-harvest handling of fruits and other perishable commodities.

j. Lack of coordination and delivery of extension services.

k. Poor infrastructure, referring mainly to road and export marketing infrastructure.

l. Little knowledge on adequate animal husbandry practices.

m. Insufficient extension services specifically addressing livestock production.

n. Small sizes of holdings for livestock production.

o. Praedial larceny.

RECOMMENDATIONS

10. Within the developmental goals of the Government the following specific objectives have been defined for the sector:

    a. Increase the acreage under agricultural use.
    b. Optimize the use of agricultural land.
    c. Raise the managerial and technological capability of the farmer.
    d. Increase the production and productivity of main crops and livestock subsectors.
    e. Create and promote mechanisms for farmers participation in the development process.
    f. Improve the efficiency of the agricultural marketing system.
    g. Facilitate the use of credit by farmers.
    h. Promote consumption of locally grown food-stuffs.
    i. Promote linkages between the agricultural sector and the tourist sector.
    j. Facilitate access to land to new farmers.

11. In terms of products which should be given priority attention the following are recommended:

    a. Food crops and vegetables: sweet potato, yam, pumpkin, tannia, dasheen, tomato, carrots, eggplant, and cassava.

    b. Fruits: mango, breadfruit, soursop, papaya.

    c. Flowers: Ginger lily, croton, heliconia, foliage.

    d. Livestock: sheep, goat, cattle, pigs.

Institutional

12. In general, the Ministry of Agriculture should play a more active role in the coordination of activities of regional, international and bilateral organizations in order to make a better use of the resources at hand and avoid, as much as possible, overlapping of activities.

13. Future developments in Grenada, with respect to the agricultural sector should be strictly market oriented, whether internal market-for import substitution- or external markets for exports. Likewise, it will be necessary to attempt joint efforts with the rest of the OECS countries so as to achieve the needed economies of scale which are precluding right now self-sustaining endeavours.

14. There is a need to rationalize the agricultural research and extension programmes so that it will directly address the stated developmental goals and objectives, and more important, the stated priorities.

15. Grenada should promote the integration of services that are common to all commodity boards in order to have a more efficient operation through economies of scale.

16. Imports and domestic distribution of fresh produce will be separated from the hands-on operations of the MNIB.

17. CATCO services should be utilized more thoroughly in the development of non-traditional exports.

18. The agricultural window of the GDB needs to be re-organized in order to improve small farmers' access to credit.

19. In order to promote livestock development the role of animal health assistants should be reviewed to incorporate all aspects of the livestock production cycle.

20. Up-grade the surveillance system for animal health and, in particular, for plant protection in order to monitor the fruit-fly free status that Grenada now enjoys.

Statutory Measures

21. Stimulate and support agro-industrial enterprises such as meat and fruit processing by a combination of extraregional import controls and provision of a special line of credit.

22. To put land back into production should be encouraged by an adequate tax system, zoning and special credit.

Commodity Programmes

23. Food crops and vegetables:

- increase and decentralize the production and distribution of high quality food crop and vegetable planting materials.

- continue the process of introduction and screening of new varieties and cultivars.

24. Fruit crops:

- strengthen the operation and management of the central propagation unit and establish satellite nurseries for distribution of fruit tree plants.

- advance and support the creation of a multinational germplasm bank of fruit species for the Eastern Caribbean.

Projects

25. Strengthening production/marketing capabilities of small farmers organizatons.

26. Irrigation of fruits, food crops and vegetables in the dry areas of the island.

27. Rehabilitation of fruit tree resources.

28. Pilot projects to determine the economic feasibility of:

- macadamia nut
- papaya
- soursop
- passion fruit
- carambola
- ASEAN fruits (mangosteens, langsat, rambutan)

29. Construction of handling and storage facilities for export crops.

30. Pilot projects to determine the economic viability of ruminant production within the Model Farm Scheme.

31. Support to increased production of existing livestock systems.

32. Reorganization of the Carriacou Sheep Project.

33. Development of communal grazing pastures for landless farmers in Carriacou.

GRENADA
APPRAISAL OF THE AGRICULTURAL SECTOR FOR POLICY AND PROJECT IDENTIFICATION

I. BACKGROUND

1.1 Main characteristics and evolution of the economy

Grenada, with a population of 89 thousand (1981 figures) and a land area of 117 sq miles is the southern most of the chain of volcanic island of the Caribbean rim.

The performance of the economy of Grenada, as measured by the evolution of the GDP, has been increasing, at current prices, during the present decade mainly due to the growth on the service and public sectors, and in construction activities in the past two years (Table 1.1.1).1/ Agriculture has performed rather erratically during the period, while Government services have been consistently and strongly on the increase during the period. If analysed in relative terms, it can be seen that the contribution to GDP by the agricultural sector has been declining, having gone from almost 22% in 1980 to a little over 15% in 1986. Hotel and restaurant and construction sectors have increased their relative contribution to it while wholesale and retail trade have a minor participation in the formation of GDP.

Unemployment, according to the 1987 population census, is about 31%. Among males, it is around the 26% level, while among females, unemployment rate reaches almost 39%. (Table 1.1.2).

Tourism, although recovering since 1984, is far from the historical figures, both in terms of numbers and in terms of income generated. Even the number of beds available is smaller than in 1975.

In terms of the external trade sector, the situation is difficult. Historically Grenada has been unable to generate enough foreign exchange to cover its import bill. The deficit of the balance of visible trade, as reported by the Central Statistical Office, has ranged in the past decade from EC$ 32 million to an all time high (in current dollars) of EC$ 147 million (Table 1.1.3).

The ratio of imports plus exports to GDP provides a measure of the degree of opennes of the economy. Grenada's ratio has ranged, during the present decade, between .86 and 1.05 which is extremely high (see Table 1.1.4).

1/ All tables are presented in the Volume II-Annexes

The distribution of loans and advances to the different sectors of the economy provides an idea of the allocation of savings within the country (Table 1.1.5). It is interesting to note that agriculture has been decreasing its relative participation in the total amount of credit given in a year, although a slight recovery is noticeable in the 1986 figures. Nevertheless, it is impressive to notice that Agriculture, the sector of the economy which contributes 15% of the GDP, only receives between 2% to 3% of the total credit granted in the country in any given year. The main portion of the credit is allocated to non-productive sectors such as distribution and personal loans.

External public debt represents a little over 51% of GDP while the debt service represents over 10% of GDP and 20% of export revenues (Table 1.1.6). This means that, on top of the chronic deficit of the trade balance, Grenada has to devote 1/5 of its total foreign exchange revenues to the debt service. It is indeed quite a burden that is conditioning the goals and developmental strategy of the country.

Public sector deficit has decreased since 1982, but as of 1985 was still 54 million EC dollars (Table 1.1.7).

In summary, the main problems that the economy of Grenada is facing are:

a. a large debt to be serviced
b. an oversized civil service
c. frequent cash flow problems
d. production decline
e. incapacity to generate sufficient foreign exchange
f. chronic deficit of current account
g. chronically high unemployment (25%-30%)

1.2 The Development Strategy

In order to devise a development strategy it is necessary first to consider the situation already discussed, along with the main characteristics of Grenada. In fact, many of these are common to all the OECS countries. They are:

a. Extremely open economy, that makes them vulnerable to external forces with little capacity to protect themselves from them.

b. Very high, and chronic, unemployment rates, presenting not only a social problem but also an economic waste of a valuable resource.

c. Minute local market, thus precluding self-sustaining industrially based development.

d. Common monetary authority which precludes direct

control by the country of the monetary emission or interest rates.

e. Currency tied to the value of the US dollar, therefore the exchange rate is another macroeconomic variable that cannot be handled to help overcome constraints determined by external situations.

The margin for manoeuvre left to the Government is, therefore, very narrow. In fact, the main macroeconomic variable left for adjustment of the economy is labour. There are two possible ways of handling it, through productivity or controlling its price. The first option, politically more palatable, is directly linked to the technological aspects, which are of major concern for the agricultural sector.

With these considerations in mind, the Government of Grenada has defined the following goals for the economy as a whole:

" - to achieve a real growth rate of 4 per cent over the planning period 1986-1990.
- to control inflation
- to reduce unemployment
- to raise the living standards of the population
- to improve the distribution of income" (1)

The strategy selected to achieve these goals centers on developing the foreign exchange generating sectors and on improving the demand for labour. All this, with an eye on the revitalization of the private sector while improving the efficiency of the public sector and diminishing its presence in the economy. To accomplish these, the main elements of the strategy target on the promotion of agriculture, tourism and processing of agricultural products, in that order.

1.3 The Agricultural Development Strategy.

The above considerations provide a general framework for the definition of the role of the agricultural sector and the strategy for its development. It is expected that agriculture, along with tourism and industry, will play a major role in the generation/savings of foreign exchange and in the creation of a steady demand for labour.

Within this framework, Government has defined for the Agricultural sector the general goal of revitalizing and diversifying agricultural activity, including livestock development.

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(1) Grenada, National Development Strategy, A report of the National economic council

In order to achieve this difficult task it is necessary to present a clear picture of the present state of the agricultural sector and the principal constraints to production, marketing and institutional development. What follows then is a review of the performance of the sector and participating institutions and organizations, including major actions recently undertaken. This is followed by a definition of specific or instrumental objectives and a series of recommendations to achieve the objectives set for the sector.

II. THE AGRICULTURAL SECTOR

2.1 The Environment

Grenada has a tropical marine climate with relatively high annual mean temperature ranging from 23oC (73oF) to 29oC (85oF); a distinct wet season (June to January, 50-120 inches/year, depending on location) and dry season between February and May, with humidity averaging 75-80% year-round.

The prevailing winds are the NE Tradewinds which are particularly strong during the dry season. While winds are usually moderate in the wet season, there are occasional heavy storms or hurricanes in the August-November period which cause significant damage.

The island and its territories (Carriacou and Petit Martinique) are mountainous and of volcanic origin, with many peaks and narrow deep valleys. The agriculture of the country is defined by this topography as may be gleaned from Table 2.1.1. Although the highest peak in the island reaches only little over 2.7 thousand feets, over 50 percent of total land area is located above 500 feet.

Seventy one percent of Grenada's land surface has slopes of 20% or more and virtually all of the flat land is confined to the lower reaches of the river valleys. This condition plus the higher rainfall to which most of these soils are exposed requires very careful management in order to minimize the serious threat of erosion. According to

Vernon's 1959 land capability study, 50% of Grenada's 73475 acres are only suited for tree crop or natural vegetation, 24% are only suited for natural forest and only 26% fall into classes I to III which can be cultivated, some with strong limitations.

While Grenada is located south of the main hurricane path, in general, tropical storms are recurrent events. Tradewinds prevail throughout the year but are stronger during the dry season. These winds generally blow in the north west direction and across the highlands. Fruit trees in exposed areas should be provided with wind breaks to minimize damage. Annual rainfall ranges from 1000 to 4100mm, but in terms of fruit crop requirement the distribution pattern is more important than the total. Five humidity regions have been identified in Grenada based on the length and intensity of the dry season:

Region 1 : 6 to 7 months - very intensive dry season
Region 2 : 4 to 5 months - intense dry season
Region 3 : 3 dry months - marked dry season
Region 4 : 2 dry months - weak dry season
Region 5 : Less than 2 dry months - Very weak dry season

2.2 Area under Cultivation & Land Capability

The current Land Use Map of Grenada is based on detailed aerial photographs taken in 1982. The results are summarized in table 2.2.1.

About 38 thousand acres are considered as having soils suitable for cultivation but most of this, some 34 thousand acres, is on land with slopes ranging between 10o and 30o.

There are at least fourteen distinct soil types in Grenada, but four of these predominate (see Table 2.2.2). Three of these soils are of medium fertility and internally well drained. They are suitable for growing most crops, excepting as their use is qualified by steepness of slope and frequency and intensity of drought. For these reasons each location must be evaluated in terms of the combined conditions of soil, slope and humidity - the last two being of more critical importance than soils. The maps 2, 3 and 4, indicate the extent of the three main soil types, the general conditions of slope and the incidence of drought.

From these maps it may be seen that the Woburn Clay Loam which is found in the drier South, South West and North West is an ideal soil for crops which require a dry season (such as mangoes) or which are drought tolerant such as some citrus varieties, guava and pineapples.

The Capital and Belmont Clay Loams (the "Red Earth" and "Brown Earth" soils) are the best soils in the island but in extent coincide with the central slopes which range from 10 to 30 degrees. Because of this, some phases of these soils are very steep and shallow and should be used only for tree crops and with strict conservation measures. These areas are suitable for Cocoa, Nutmegs, Coffee and Fruit Trees. On the gentle slopes all of these and many food crops may be planted, as well as small areas of vegetables in carefully chosen spots. In the extreme south-east reaches of these soils, in the drier areas, citrus and pineapples may be grown. However, complementary irrigation may be needed.

2.3 Structural Characteristics of the Agricultural Sector

2.3.1 Number and size of holdings

The 1981 Agricultural Census established that there were 8200 farmers in Grenada, more or less equally divided between "full time" and "part-time" farmers. The overriding characteristic of all farmers is the relatively small size of holdings: 49% were farming between 1 and 5 acres.

The performance of part-time farming appears to be correlated with the size of the holdings, which would sustain the long held contention that acreages are

insufficient to adequately support a family, particularly because the cultivation is mainly directed to tree crops. Full-time farmers occupied 68% of all farm land while part-timers controlled only 32%.

Fifty percent of all farmers occupy, on the average, one half acre each, and since there are very few intensive cultivations, it would be difficult to distinguish between the 20% who are classified as full time and the 30% classified as part time, on the basis of returns to the land.

It may be safely assumed therefore, that :

- the so-called "full-timers" are chronically under-employed, and that

- within the sector, as structured, little room exists for reducing the 31% unemployment rate estimated in January for the economy as a whole.

An important, though relatively small, class of farmers are the 10% who occupy holdings in the range of 5-25 acres and nearly as much as 88% who occupy holdings of less than 5 acres and control 24% of all farm land.

At the top end of the scale, 1.4% of the farmers (actually 120 in absolute numbers) occupy holdings over 25 acres in size and within this group, .3% (24 farmers) have an average of well over 400 acres each and control of most good quality farm land.

2.3.2 Land Tenure

In respect of ownership patterns, two thirds of all farms are clearly freehold properties either individually (47%) or family owned (19%). However, the number of freehold farms is probably nearer to 80% of all farms, as the 1981 census did not identify the tenure status of farms employing a manager, and another 8% of farmers both owned and rented land (see Table 2.3.2-1).

2.3.3 Fragmentation of Holdings

Fragmentation and distance from dwelling place adds significantly to the problems already generated by the very small holdings of Grenada farmers. More than one third of all farms in the size range of 0-5 acres are divided into two or more adjoining parcels while in the size range of 5-10 acres most of the farms are divided into two and more separate parcels. This last statement is also true of farms over 10 acres ("large farms") but the impact is more difficult to accurately assess since, as shown in Table 2.3.3-1, the size range is from 10 to over 400 acres.

In the small farm category the average size of a parcel is just about one acre while in the medium farm size class the average size of a separate parcel is over three acres (see Table 2.3.3-1). This fragmentation effect could be buffered in part by the farming system which focusses on tree-crops, but it does complicate ordinary field management practices such as pest and disease control and the adoption of even simple technology such as basic machinery. Distance of farm holdings of a mile or more, also complicates management, particularly if the farmer is a part timer. This, coupled with the ocurrence of fragmentation, exposes farmers to losses from praedial larceny. Twenty six percent of all farmers who operate farms between 2 to 10 acres in size consider this their most severe problem, as do 30% of the farmers who operate farms of over 10 acres.

2.3.4 Farming Systems

The two main characteristics of Grenada farmers are: concentration on tree crops and the diversity of the cultivation as is shown in Table 2.3.4.-1.

However, to an even greater extent than other territories in the region, mixed cultivation is the norm, and in Grenada such cultivation covers 80% of the total acreage in agricultural use or 50% of the total land.

As to livestock, except for broilers, there is no large scale or intensive livestock production. Some 31% of all farmers keep small livestock (mainly sheep and goats and backyard chickens) and 14% keep cattle. The total numbers are presented in Table 2.3.4-2.

2.4 Characteristics of Farmers

2.4.1 Small Farm Incomes

Information on farmers' income is very difficult to obtain. CARDI made a detailed year long study of production on 20 small farms in 1980-1981, the results of which are shown in Table 2.4.1-1. Unfortunately it has not been possible to have access to the analysis of the findings of this study.

Nevertheless, what is disturbing in these figures is that 60% of the farmers were losing money on their annual operation, as much as EC$4000 in one case, on an average cash expenditure of less than EC$ 1500. The obvious conclusion is that farmers are not even earning a reasonable labour income on their own farms.

In respect of the income of labour in both government and non-government occupations, agricultural labour receives an annual income lower than unskilled labour by between EC$ 700 and EC$ 2000 (Table 2.4.1-2). This is one of the reasons for the severe and persistant rural unemployment even while it

is said that there is a shortage of labour in the countryside.

2.4.2 Age and Gender of Small Farmers

As shown in table 2.4.2-1 and figure 2.4.2, over 30% of the farmers were over 60 years old and 52% were over 50 years old five years ago, and, while there are no actual figures available, one may safely assume, given the problem of income discussed above, that the number of young persons entering into farming in the past five years is nowhere near balancing this advancing age phenomenon. However, at the same time, there is an encouraging number of farmers, some 28%, who were 45 years of age, and below, in 1981. Also, from discussions with people well acquainted with the agricultural sector, this tendency of agricultural population ageing seems to be reversing but no figures are available to confirm this.

As to gender, in 1982 three out of every eight farmers (38%) were women (see Table 2.4.2-2). In other words, they were making the major decisions at the farm level. Also, the agricultural labour force, stated as 12380 persons in 1981, represents one third of the total working population, some 25% of which are women. It should also be noted that traditionally, the regional trade of agricultural produce is almost exclusively in the hands of women.

2.5 Institutional Structure

2.5.1 Public Sector Institutions

The national institutions making up the agricultural sector in Grenada are the Ministry of Agriculture, The Marketing And National Importing Board, the Grenada Development Bank and the Model Farms Corporation. These institutions and their inter-relationships are indicated in figure 2.5.1.

2.5.1.1 Ministry of Agriculture

The MOA has 187 established positions of which some 10% are vacant. In December 1986 there were 168 staff in place working in the different Division/Departments of the Ministry.

The overall structure follows the classical English Civil Service design, with the Permanent Secretary responsible for overall coordination, budget and personnel management, and a Chief Technical Officer, with its deputy, responsible for the technical administration of the Ministry's operation. The following are the Division/Departments in

which the Ministry is divided, and their main responsibilities.1/

Administration: Provides the necessary administrative support and follow-up to operations of the Ministry.

Planning and Statistics: Generation and analysis of information needed for decision making, under the form of plans, programmes and investment projects. Is also responsible for monitoring the implementation of programmes and projects and for the performance of the agricultural sector as a whole. So far the main activity of the unit has been to compile trade statistics.

Produce Chemist Laboratory: It is responsible for: analysing food and drugs; issuing licenses for importation of pesticides; processing fruit juices; microbiological analysis of milk, fish, animal feed and candied fruits; technical assistance to small processors on processing, labelling and packaging; and the operation of the Coffee Processing Plant.

Extension Division: Its main purpose is to assist the farming community in analysing and solving their problems promoting the development of desirable attitudes among farmers, broadening their knowledge and increasing their skills.

Agronomy (research) Division: Responsible for carrying out the agronomical research in Grenada and for the plant propagation operation.

Pest Management Unit: Since 1985 it has replaced the Plant Protection Division. It is responsible for issuing import permits and phytosanitary certificates and for carrying out the fruit fly and the mango seed-weevil surveys.

Veterinary and Livestock Division: The purpose of this Division is to promote the development of the livestock industry in Grenada. This is being undertaken by training in disease prevention and control, establishment of improved pastures and improved husbandry and managerial skills. Field clinics provide the necessary veterinary care for animals in the farms.

Agro-services: It aims at helping the farmers increase their productivity and improve marketing through the farm roads and farm machinery operations.

1/ A detailed description of each division/department, including personnel could be found in the Annex in Volume II.

Land and Water Resources Unit: In charge of land use and hydrological resources. Their main functions have related to the determination of the upper watershed.

Lands and Surveys Department: Its responsibilities include surveying Government land, surveys of land identified by Government for acquisition, carrying out subdivision surveys of Government land and maintaining an up-dated record of all Government land.

Forestry Department: It is charged with supervising, controlling and developing the forests of Grenada. It entails the preservation of tree cover to prevent erosion and protect flora and fauna; the organized exploitation of the forest products; technical assistance to private owners of forests; establishment of recreation center; forest research; promotion of forest industries and provision of forest-related training.

2.5.1.2 The Marketing and National Import Board

The Marketing and National Import Board (MNIB) is a statutory Government Body established in 1973, under the administration of the Ministry of Trade. Its primary mandate is to purchase and market locally produced agricultural commodities, excluding the traditional export crops. However, for the past seven years the imports of rice, sugar, powder milk and , periodically, other items such as cement, have accounted for the majority of its operations.

The MNIB has five Divisions (imports, procurement, shipping, accounts, administration) and employs some seventy persons, over 90% of which on a full time basis. Its policy guidelines are formulated by a government appointed Board of Directors, and handed down to the General Manager.

During the period February 1986 to January 1987 a full-time marketing specialist under the Agricultural Rehabilitation and Crop Diversification Project provided technical assistance to MNIB on export marketing of fruits, vegetables and cut flowers.

2.5.1.3 Grenada Development Bank

The Grenada Development Bank (GDB) is a lending agency established in 1976 with the purpose of supporting agricultural and industrial development within the guidelines of Caribbean development credit, as established by the Caribbean Development Bank (CDB).

The Manager of the GDB is responsible to a Government-appointed Board of Directors. He has a direct relationship with the Farm Improvement Officer (FIO) and the Industrial

Development Specialist (IDS), both of whom are employees of the Caribbean Development Bank which provides a sizeable proportion of the GDB's lending funds. The FIO and IDS also perform the duties of the Senior Agricultural Credit Officer (SACO) and the Senior Industrial Credit Officer (SICO), respectively. They are fully integrated into the organizational structure of the GDB and, despite being employees of the CDB, have direct responsibility to the Manager of the GDB.

2.5.1.4 Grenada Model Farms Corporation

Through appropriate legislation, enacted August 25, 1986, the Model Farms Corporation (MFC) was created in place of the Grenada Farms Corporation (GFC). This Act establishes a seven member Government appointed Board of Directors. A General Manager reports to the Board, and is responsible for the overall operations of the twenty three agricultural farms vested in the MFC farms.

The General Manager is the Chief Executive of the Corporation and is responsible for carrying out its general policy, including:

i. the preparation of a comprehensive development plan of model farms;

ii. the maintenance, management and control of all vested farms (approximately 3200 acres) until they are disposed of as model farms, and

iii. the settlement of small farmers on viable small farm units.

2.5.2 Private Sector Institutions

The principal private sector institutions and organizations relevant to the development of the agricultural sector in Grenada include the commerical banks, the National Development Foundation, the Grenada Credit Union League, the Agency for Rural Transformation, the four commodity Associations/societies (nutmeg, cocoa, banana and minor spices) and a few cooperatives and farmers organizations.

2.5.2.1 Commercial Banks

There are five banks in Grenada. These include Barclay's, Nova Scotia, National Commercial, Grenada Bank of Commerce and Grenada Cooperative Bank. The first four are commercial banks and the GCB is a savings and mortgage loans institution. While there is no participation at present by these banks in international or national agricultural development credit schemes, some individual banks have small scale agricultural portfolios (see section 2.6.1).

2.5.2.2 National Development Foundation

The National Development Foundation (NDF) of Grenada is a member of the Eastern Caribbean Organization of Development Foundations. The NDF was founded in Grenada in 1984. Its principal functions include the funding of small business projects, technical assistance and training. Loans of up to EC$ 30 thousand are provided for small shops, crafts, fisheries projects and agriculture. Little emphasis is given to farm loans and only one loan to a group of seven farmers for banana production has been made to date. The NDF collaborates with the OAS's skills training programme and provides credit to qualified applicants after completion of a training programme. The NDF prefers a market led approach to development but provides no assistance in marketing. It can provide technical assistance and training in production, organization for production and marketing and finance. The main source of funding of NDF is USAID's Small Enterprise Assistance Project which provides US$ 750 thousand, of which US$ 400 thousand is for loans and the balance for administration, over a three year period.

2.5.2.3 Agency for Rural Transformation

The Agency for Rural Transformation (ART) is a non-profit development agency based in Grenada, which works with and through community based groups and projects in benefit of agricultural workers, women, youth, farmers and handicraft producers. It serves as a channel for resources from donor agencies for rural development. ART organizes training programmes in priority areas as determined by members of rural organizations. It is taking the leadership in the establishment of a network of national, regional and international support organizations interested in rural development activities.

2.5.2.4 Farmers and Rural Organizations

There are 11 organizations made up of farmers and other rural inhabitants which have been either established in accordance with legislation or are in the process of organizing themselves.

a. Grenada Co-operative Nutmeg Association

This co-operative was established in 1947 with the objective of increasing grower's share of price by elimination of middlemen, achieving price stability, promoting high quality production and remedying disorderly conditions by regulation and control of the industry. The GCNA is managed and controlled by a board of directors who oversee a General Manager of operations. Of the approximately 8000 registered

members of GCNA, some 6500 received surplus payments in 1986, indicating their activity in the industry by selling at least one half pound of nutmeg.

Operations take place at up to as many as 21 receiving stations and three pools where processing for export, packaging and storage occurs. For more detailed information see Table 2.5.2-1.

b. Grenada Cocoa Association

This Association was formed in 1964 with objectives oriented towards maximization of income from exports by: improvement of quality of beans, improvement of plant and equipment, formation of receiving stations and establishment of favourable conditions for postharvest handling and marketing of cocoa.

The secretary/manager is responsible for day to day operations and to a nine member Board of Directors. Services are provided to approximately 7000 members by a staff of 55 salaried employees and as many as 200 daily paid workers.

Cocoa is purchased at 24 buying points and fermented/processed at the Mt. Horne and Carlton fermentaries (Table 2.5.2-1).

c. Grenada Banana Co-operative Society

Formed in 1954 the Society's objectives include: the regulation/control of the activities of the industry related to production/marketing for export; provision of facilitating services, and other activities to promote the development of the industry.

The Board oversees a General Manager who supervises a staff of approximately 60 persons. In 1986 approximately 170 daily paid workers were employed by the society. The GBCS has 6 boxing plants of which only four operated in 1986. These are in declining use as field packaging increases.

Of its registered membership of approximately 1100, some 850 were active producers/exporters of bananas in 1986 (Table 2.5.2-1).

d. Minor Spices Co-operative Marketing Society

This society was formed in 1971 and has a registered membership of 2600 farmers. The objectives for which the society was established include: development and encouragement of improved methods of production, processing and marketing; maximization of returns by procurement of inputs and machinery and best prices for products; capitalization to provide necessary facilities and

coordination with other organizations and the public in general.

A seven member managing committee guides the business of this society and appoints/supervises a secretary/manager who manages daily operations. Nine persons make up the total staff of MSCMS and these work out of the head office in St. George's. Purchasing is done through the Nutmeg Association buying points.

e. Young Workers Co-operative Society Ltd.

This primary society was registered in 1975. It has a membership of 5 farmers. It was set up to produce cocoa, nutmeg and bananas on a common piece of land (10 acres) leased from Government. It was nearly inactive in 1987.

f. National Productive Farmers Union

Established in 1980, this group had over 1300 members at its peak of operations in 1983. Its present membership is under 800. It was established to: represent the interests of small and medium size farmers before Government; to distribute farm inputs and market farm produce; improve the extension services; reduce praedial larceny, and contribute to the education of farm families.

Past experiences included retail sales of farm inputs, extension activities, a credit scheme and training activities.

The PFU is now going through a reorganization. It will be managed by an Executive Board, a secretary/manager and delegates from each parish.

g. Grenada Cane Farmers Association Ltd.

This association was formed in 1984 to provide cane farmers with effective representation in their dealings with the Grenada Sugar Factory Ltd., small syrup mills and other entities. Other objectives include pest/disease control, extension services, ploughing and transportation services, obtention of credit for members, improvement of processing facilities and other services such as supply of fertilizers and farm inputs and information.

The association is directed by a Board of elected members and managed by a secretary/manager. Although there are some 500 farmers engaged in growing cane for sale only 100 or so are members of the association.

Capital investment is limited to a few pieces of equipment and the only employed person is the secretary/manager.

h. Concord and New Hampshire Co-operative Marketing and Supply Centers

Although not officially registered this group was formed by 200 farmers in 1984. External and national financing of an amount close to EC$ 2 million was obtained and invested in two main marketing and supply centres. These centres were opened in 1985 and are being operated as co-operatives.

An inter-institutional steering committee composed of one farmer from each centre and representatives from MOA, ART and the Co-ops department provide direction and evaluation of progress. Each centre has its own management committee which supervise operations and daily activities of one paid employee at each centre.

i. Carinut Agricultural Production Co-operative

Started by 3 farmers in Carriacou in 1977 this cooperative was formalized in 1985 with a membership of seven persons. Its objectives are to promote agricultural development, provide land preparation services, improve agriculural technology and establish a peanut producing project. The group produces, grades and markets peanuts, cassava and tomatoes.

j. Grenfruit Women's Co-operative Society Ltd.

This co-operative was registered in 1982 with a total membership of 7 women. Since then it has expanded its membership to nearly 20.

The objectives of the group are oriented towards: the development of community spirit; provision of self-employment opportunities; utilization of local raw materials for producing agro-products; and the prduction of candied fruits and ground spice for local and regional markets.

Functions carried out include the purchase of raw materials, processing, packaging, distribution and sales of candied fruits, including paw-paw, damson, mace, cloves, cinnamom, ginger and tumeric. These operations are carried out at a facility at Grand Roy where the processing equipment is centralized.

2.5.3 Regional and International Organizations and Development Projects underway or in pipe-line.

2.5.3.1 Regional Organizations

a. CARDI

The Caribbean Agricultural Research and Development Institute is financed mainly by regional governments and

special projects. It maintains an office in each member territory, which is managed by the Country Team Leader (CTL) who is responsible to the Institute's Executive Director, based in Trinidad. The CTL also directs and supervises CARDI's Farming Systems Research Project in Grenada.

During 1985 CARDI's activities in Grenada concentrated on the identification, multiplication and distribution of planting materials of legumes, grains, and root crops. Emphasis was also placed on investigation of the appropriateness of different cropping systems involving legumes/roots, legumes/grains, and root/grains.

b. CARDATS

The Caribbean Agricultural Rural Development And Advisory Training Services is financed by UNDP and executed by FAO in coordination with CARICOM.

c. CDB

The Caribbean Development Bank is headquartered in Barbados. It provides technical assistance in project formulation and evaluation and offers diverse lines of credit for development purposes. In Grenada, the CDB funds are channeled through the GDB.

They are partially financing the Agricultural Diversification and Rehabilitation Project, the Carriacou Sheep Development Project and the line of credit at the GDB as the sole financing agency.

d. CAEP

The Caribbean Agricultural Extension Project is funded by USAID. Its major thrust is towards strengthening of the national agricultural extension services.

2.5.3.2 Bilateral organizations

a. French Agricultural Co-operation

Started operations in Grenada in 1981, and is currently involved in agricultural production and marketing activities in economically depressed areas. Support to two agricultural supply and marketing centres is seen as its major activities to date. These two centres have 120 and 80 registered members, and are equipped with facilities for farm input storage respectively, and produce handling. Animal production activities are programmed for 1988.

b. USAID

Since 1984 a sub-office has been operating in Grenada to

administer a series of developmental projects in the areas of conservation and afforestation, support to 4H development and the Agricultural Sector Revitalization Project.

c. CIDA

Provides funding for development projects and also finances technical assitance. It administers its aid from the regional headquarters in Barbados. The main project under their financing in the Agricultural Sector is the Cocoa Rehabilitation Project.

d. BDD

Some of the projects include short and medium term technical assistance, having concentrated recently on forestry and conservation aspects.

e. HIVOS

This Dutch non-governmental development agency concentrates mainly on projects that directly benefit the rural population. Support has been provided in the past to Concord/New Hampshire Marketing and Supply Centre, the Mirabeau Seedling Centre, Grenada Cane Farmers Association and the Carinut Agricultural Farmers Associations.

2.5.3.3 International Organizations

a. IICA

The Interamerican Institute for Cooperation on Agriculture maintains a permanent office in Grenada. IICA is currently involved in pest management and plant protection and quarantine, fruit production/marketing, Fruit Fly Survey, Project identification/project formulation, strengthening of farmers organizations, on animal health and on generation and transfer of technology.

b. FAO/UNDP

These two UN system organizations have been providing assistance to Grenada's agricultural sector in different areas. A UNDP plant propagation and production specialist has been working in Grenada for the past decade. The principal areas supported by FAO have included fruit crop development, support to the Produce Chemist Laboratory, support to CARDATS, improvement of Mirabeau Seedling Centre, Establishing of the Mirabeau Soil Testing Laboratory and strenghtening of the pest management and plant quarantine services. The FAO Regional Project oriented towards the reduction of Postharvest losses also operates in Grenada.

c. CFTC

It has provided assistance to Grenada to strengthen veterinarian services, forestry development and some farm development.

d. IFAD

It has financed the Artisanal Fisheries Project and is presently considering a project oriented towards the strengthening of farmers organizations.

e. IBRD/IDA

The World Bank is providing financing for credit, infrastructure and technical assistance through the Agricultural Rehabilitation and Crops Diversification Project.

f. EDF

The European Development Fund has contributed mainly to the Mirabeau Agriculture Training Project.

In synthesis, the development projects impacting and being implemented by diverse organizations upon the agricultural sector are:

NAME	SOURCE OF $	AREA COVERED
-Model Farms Project	UNDP/FAO	Land distribution
-Agricultural Rehabilit. Crop Diversif. Proj.	WB/CDB	Credit/Infrast. Marketing/Prod.
-Increasing MOA Plant Protection Skills	IICA	Pest management/ plant quarantine
-Fruit Fly Survey and Trapping	USAID/USDA/ IICA	Identification of fruit pests
-Cocoa Rehabilitation	CIDA	Production
-Moko Eradication II	EDF	Pest control
-Analytical Chemist Produce Laboratory	UNDP	Institutional strengthening
-Prevention of Food Losses	FAO	Post Harvest Hand.
-Annandale Watershed Dev.	USAID	Erosion control
-Grand Etang Afforest.	BDD	Afforestation
-Queens Park Saw Mill	BDD	Forestry develp.
-CAEP	USAID/UWI/MUCIA	Extension
-HIAMP	USAID	Equity financing
-CATCO	Lomme III	Trading
-Strengthening farmers organizations	IICA	Management/ marketing
-Strengthening Technol. Generation and Transfer	IICA	Institutional strengthening

2.6 Credit

Grenadian farmers have access to credit from a diverse set of institutions and sources, including: Commercial Banks, Grenada Development Bank, Credit Unions, Commodity associations and informal sources. The commercial banks provide the largest amount of credit, but it is primarily short term for traditional export crops. Commodity associations provide additional short term funding for the same crops. Only the GDB and the rural Credit Unions provide significant amounts of longer term capital for on-farm investments either from their regular lines of credit or from special projects.

2.6.1 Sources of credit

2.6.1.1 Commercial Banks

Barclay's Bank operates a Farm Plan scheme lending programme targeted at farmers with between 5-50 acres. This programme is coordinated on a regional basis by a manager headquartered in Barbados. Loans in 1984 averaged about EC $5000 each and were made at one point below the Bank's prime borrower interest rate. Repayment under the Plan is tailored to suit the particular crop and is given more flexibility than normal loans with respect to guarantee requirements. The Farm Plan Scheme portfolio totalled EC$ 225 thousand in 1983 and was evenly distributed among short, medium and long term loans. The Farm Plan Scheme portfolio suffered a 30% arrears rate in 1984. Agricultural loans by other commercial banks in the island are generally in the range of EC$5000 - EC$10000. These banks prefer to lend to full time, larger farmers, (over 10 acres), from EC$ 10 thousand upwards. They have, therefore, avoided lending to small peasant and subsistance farmers as these loans are less profitable, harder to evaluate and their credit worthiness more difficult to appraise. Margins on small loans are unattractive, and the risk is perceived as greater than for the typical beneficiary. The banks generally lend short-term and "very little" over three year term. The present general policy is to get all longer term loans off the books.

Generally the commercial banks express reluctance to participate in agricultural project lending for non-traditional export crops (vegetable/food and tree crops). They have pointed out their relatively limited experience in such lending, their lack of appropriately trained staff in general and staff for loans supervision in particular. They also emphasize the lack of strong guarantees such as secure markets and/or crop liens.

2.6.1.2 Grenada Development Bank

For Agriculture, GDB's lending is within the CDB's credit

guidelines. There is a global line of credit from the CDB that includes both agriculture and industry (AIC). At present GDB has little of its own funds for lending. Agricultural loans are available for:

- on farm infrastructure for all crops and livestock production and marketing, including irrigation, construction of access and on-farm houses and farm buildings.

- transport, equipment and capital facilities for storage, packing and processing.

- establishment of crops, including such operations as erosion control measures, establishment of drains and terracing, purchase of planting material, nursery establishment, application of fertilizers, pesticides, and herbicides, employment of management and labour.

- establishment of agro-based industries using raw materials from agriculture.

- medium or long term related programmes, specifically designed to raise agricultural productivity levels.

Loan collateral requirements include mortgages, bills of sale and crop liens where secured marketing arrangements satisfactory to the Bank exist. Strict mortgage title requirements sometimes present an obstacle to many small farmers who generally do not have title or secure tenancy. GDB has made arrangements with the Model Farms Project through which they accept a mortgage on the lease of the land. In addition, legal arrangements appear cumbersome and time-consuming to farmers. The one weakness to the system of crop lien collateral is the ability and tendency of small farmers to sell non-traditional crops outside contracted marketing arrangements when open market prices are more favourable, thus by-passing the guarantee arrangement. Such a problem plagued the Bank's recent effort to finance non-traditional export crops.

Agricultural lending is geared towards small loans to small and medium commercial farmers. Interest rates range from 9.5% to 10% per annum. Current agricultural loans range form EC$ 1 thousand to a limit of EC$ 540 thousand. Loans are made for a period that ranges from less than a year to up to seven years. In special cases they can be granted for up to 10 years. Loans up to EC$ 6700 are approved by the Manager, from that limit up to EC$ 25 thousand by an Internal Management Committee and over EC$ 25 thousand it has to be approved by the Directors of the Bank. The GDB estimates that between 30% to 40% of individual agricultural loans are in arrears or have failed to follow the farm plan as

outlined in the loan application and project document.

GDB's lending statistics for 1980-1983 show that agricultural lending slipped both, in absolute terms and in relative terms vis-a-vis the Bank's portfolio. This is due to steep decline in credit demand for banana, cocoa, nutmeg, sugarcane, livestock and farm transport/equipment. In 1981 GDB made no loans for root crops, poultry and infrastructure. This trend has been reversed since then mainly due to an increase in lending to traditional export crops (Table 2.6.1.2-1).

2.6.1.3 Other sources of credit

a. Credit Unions

The Credit Union movement is another source of credit for small farmers in the island. There are 18 Credit Unions, ten being predominantly rural and agricultural in membership, with four being in high production areas.

b. Commodity Organizations

These are quasi-public statutory bodies whose main function is to act as the monopoly marketing agent for specific agricultural products. They work almost exclusively in the traditional export crop sector, marketing bananas, nutmeg and mace, cocoa and minor spices.

2.6.2 Demand for Credit

Demand for agricultural credit is relatively low. There are several reasons for this:

a. Low and uncertain returns. The former due to high production costs vis-a-vis the market prices. The latter due to inherent production and market uncertainties of the agricultural sector.

b. Cumbersome and time consuming procedures to obtain a loan.

c. The existing tradition among small farmers of avoiding credit, in part out of fear of defaulting and losing their land. Many farmers will reject a loan if they have to offer their land as security. In addition, what little security the farmers have is usually already committed for non-agricultural purposes.

d. The fact that farmers usually have other sources of finance for agricultural production than banks. These are non-farm employment, remittances from abroad, informal sources such as neighbours and friends, shopkeepers and "sous-sous".

e. The prevailing crop pattern which provides funds for on-farm investment and discourages the use of credit. Unlike most seasonal crops, cocoa, nutmegs and particularly bananas bring in cash income year-round, as a result farmers require less credit.

f. The decreasing number of farmers due to low prestige and rewards from agriculture. The present average age of agricultural workers is high, as they retire they are not being replaced by younger farmers.

Previous attempts at increasing production through lending in non-traditional crops have not been successful. Loans remain few. A CDB small farming study attributes the lack of applications by farmers to their feeling "...that it was not feasible to utilize loans for those crops mainly because of the lack of a stable market and the relative high cost of labour. It was evident also that the farmers preferred crops like cocoa and nutmegs which do not have to be replanted too frequently, although the farmers could go on reaping benefits..."

III. ANALYSIS OF SECTOR PERFORMANCE

3.1 Crops and livestock

3.1.1 Export crops

Since traditional export crops are fully developed and in the hands of commodity associations, they will not be analysed in-extenso in this review. These include cocoa, nutmeg, bananas and minor spices. Nevertheless in Chapter IV, dealing with marketing aspects, they are discussed.

3.1.2 Food Crops

Food crops as a group refer to a wide range of commodities that include both staples and complementary food sources. Based on consumption patterns in Grenada the following may be considered as the major basic food crops:

a. Sweet potatoes
b. Yams
c. Edible aroids (dasheen and tannia)
d. Cassava
e. Corn
f. Pigeon peas

Although statistical information is incomplete and often unreliable, the relative importance of food crops may be assessed from the point of view of domestic consumption. Data obtained from the Grenada Food and Nutrition Council for 1986 show that dasheen was the most consumed food crop (Table 3.1.2-1). Table 3.1.2-2 presents the information available on estimated local production, imports and exports of selected food crops.

3.1.2.1 Ecology

In spite of the varied climate, soil characteristics and topography of Grenada, food crops are grown all across the island. One of the main constraints to expanding their production within the limited size of the country is either the excess or shortage of water. On the main island, food crops are mainly found where rainfall ranges between 1500mm (60 ") and 3000mm (120"). However, the aroids are also produced in the central highland where annual rainfall is above 4000mm.

On the islands of Carriacou and Petit Martinique, livestock severely restricts food crop production, especially during the dry ("let go") season.

3.1.2.2 Preproduction

Planting materials for food crops generally come directly

from the farmer's own harvested crops or are obtained from neighbours. This is particularly true for asexually reproduced roots and tuber crops. This situation has contributed greatly to the lowering of crop yields, especially through carrying over of diseases and pests. Corn seed is often bought by farmers from seed stores or from the Extension Office of the Ministry.

The Mirabeau Agricultural Station of the Ministry (MAS) also supplies a small amount of food crop planting materials to farmers through the Extension Service.

Of all the food crop species locally cultivated there are many unidentified local "cultivars" from which the bulk of production is obtained. However, the most popularly grown sweet potato and yam cultivars are imported. Currently, severe shortages of yam planting material is a serious constraint. In 1985 nine cassava cultivars were imported and screened by CARDI. Four of these have since been released to MAS for multiplication and distribution.

3.1.2.3 Production to harvest

Food crops are usually grown in mixed stands. The roots and tubers are commonly interplanted with banana or other perennial crops. Corn is typically associated with pigeon peas. Cultural practices are minimal. Most farmers consider fertilization optional for most food crops and definitely unnecessary for cassava, corn and pigeon peas. However, tannia receives a fair amount of fertilizer since it is generally interplanted with bananas.

Growing period varies from three months (green corn) to a year (cassava), but pigeon peas may be kept in the field during two years to allow two reapings. Harvesting is done by hand or hand-held tools such as fork and cutlasses, raising production costs and lowering produce quality especially by increasing bruising damage to the roots and tubers. the young leaves of dasheen, including both, laminas and petioles (called "calalloo"), are harvested when the plant is about four to five months old up to when it is dug up to collect the corm. A few farmers grow dasheen mainly for calalloo as a commercial vegetable.

Data on harvested area per year is not available. Statistical information on planted acreage and production, available only for 1986 (Table 3.1.2.3-1) indicate that yields for sweet potato and dasheen were low but that they were acceptable for yams. Judging from the point of view of the technology that is being used in the traditional cropping systems yields must be, by necessity, fairly low. The slow development of irrigation systems in the country has certainly contributed to restricting crop cultivation during the dry season and thereby restricting total annual output.

3.1.2.4 Post harvest handling and processing

Except for corn and pigeon peas, the food crops produced are used fresh, so on-farm storage time is short (from two weeks for the roots to four months for yams). Corn and pigeon peas are consumed both green and dry. In this latter state farmers may store them for up to a year. Because of heavy praedial larceny, crops cannot be stored in the field, a means that would reduce spoilage and spread food availability over a longer time span.

Corn is processed to a limited extent into corn meal by private mills. The majority of cassava produced is processed into farine using traditional methods. The sole cassava factory, privately owned, appears to be on the verge of being shut down because of shortage of raw materials and its apparent inability to compete with the traditional processors for the limited supply of cassava.

The other roots, yam and pigeon peas are marketed in their raw form often directly to the final consumer through traditional channels

3.1.2.5 Institutional services

3.1.2.5.1 Research and extension

Most research on food crops has been conducted by CARDI which has established germplasm banks of sweet potato, cassava and pigeon pea. Emphasis has been placed on the collection and characterisation of local cultivars. CARDI has also developed technological packages for the production of sweet potato, aroids, corn and pigeon pea. Production systems have also been studied.

The participation of the Ministry of Agriculture in the development of food crops has been mainly through the extension services and the Plant Propagation Unit at Mirabeau Agricultural Station. The front line extension agents secure planting material from the Station for the farmers they are working with. They have not been able to involve themselves into more meaningful supportive actions to the farmers planting food crops.

The Ministry of Agriculture produces planting materials of all the selected basic food crops, except dasheen due to its ubiquity in the growing areas and ease of reproduction. Currently the Ministry has enough capacity to satisfy requests for planting materials at the present level but the majority of growers are not served due to lack of awareness on their part of the benefits of the service and to logistical difficulties. If the planted area increases, as is likely to occur, then the Ministry would not be able to cope with the increased demand for high quality planting material. Therefore, nursery establishment and plant

propagation by private concerns, including farmers organizations, will have to be promoted and suported by the Ministry.

3.1.2.5.2 Credit

Credit for food crop production is available especially through GDB utilizing a line of credit from the Agricultural Rehabilitation and Crop Diversification Project funded by the World Bank. In practice, the available credit has not been utilized as expected reasons already discussed in section 2.6.2.

3.1.2.6 Main Constraints

3.1.2.6.1 Preproduction

(a) Government and CARDI established food crop nurseries have failed to satisfy farmers' demand for planting materials. For this reason, food crop farmers are forced to rely increasingly on planting materials obtained from previous crops despite the known disadvantages in doing so.

Although it has the physical capacity, the government-owned Mirabeau Agricultural Station (MAS) seems to lack the technical and managerial capabilities to mass produce high quality food crop planting materials.

(b) Many farmers continue to cultivate indigenous sweet potato cultivars of unknown potential. The results are unpredictable and often disappointing.

(c) Usually, small and unmarketable yam tubers are used as planting materials. This could result in the inadvertent cultivation of genetically poor material.

3.1.2.6.2 Production

(a) Although CARDI has developed technological packages for most food crop species grown locally, the technologies have not been effectively transferred. Consequently, most food crop farmers still use traditional production methods, resulting in low crop yields.

(b) Fertilizers are rarely used in the production of most food crops which therefore fail to realise their known potential yields. Corn production is the possible exception, and even then, yields are still relatively low because of the inappropriateness of the rate and timing of fertilizer application.

(c) Lack of irrigation facilities limits production of sweet potato, corn and edible aroids. They are normally planted during the first four months of the 6- to 7-month wet season which commences in June or July. Planting after

that period is very risky in the absence of irrigation.

(d) Significant quantities of root crop produce are damaged during harvesting because of the harvesting tools (cutlasses and forks) used. The harvesting process is also very tedious and expensive.

(e) Prevalence of praedial larceny precludes field storage and often forces farmers to harvest crops prematurely. Consequently, produce quality is poor, and storage problems, leading to significant postharvest losses, often occur.

3.1.3 Vegetables

Traditionally, vegetable production in Grenada is a small farmer activity. Small plots (less than 0.25 acres) of a wide range of vegetables are cultivated by a large number of farmers and backyard gardeners. However, cumulatively, the acreage and quantities produced are quite significant (see Table 3.1.3-1). The most popular locally produced vegetables are:

a. Tomato
b. Cabbage
c. Carrot
d. Pumpkin
e. Callaloo (dasheen leaves)
f. Eggplant

Tomatoes are plentiful during the dry season (January - May) but scarce during the wet season (June - December). This is due to the lack of cultivars suitable for wet season production. During the past three years the local market has been over supplied with cabbages. The volume and quality of carrots produced are far below local market demand. The local market is adequately supplied with pumpkin and calalloo both of which are also exported.

Among the six commodities listed above, eggplant is the least popular on the local market. However, the commodity has export potential, and plans are being made to resume the export trade to the United Kingdom. Since 1980 several successful attempts have been made to send trial shipment to the U.K. but no large scale shipments has been made yet.

3.1.3.1 Ecology

Except for central highland areas, Grenada's ecological conditions are generally suitable for producing a wide range of vegetables, but for short periods. Rainfall is the most limiting ecological factor.

The bulk of vegetable crops is produced in the eastern and southern parts of the island within 60 inches (1500mm) and 120 inches (3000mm) of rainfall. This is, however, poorly

distributed (Table 3.1.3.1-1), and its inadequacy and excess during the dry and wet seasons, respectively, constitute severe production constraints. Thus most vegetables can be produced in the higher rainfall areas during the dry season, but not in the wet season. Year round vegetable production could be achieved in the lower rainfall areas with irrigation.

Temperature and humidity are major factors to be considered in the production of tomato and carrots. During the hot wet season atmospheric day temperatures range between 26oC and 30oC and are ideal for the development of soft rot disease in carrot under conditions of high atmospheric humidity. High soil temperature results in poorly developed (light-coloured and small diameter) carrot tubers. High temperatures also adversely affect tomato fruit set in most of the tomato cultivars grown locally.

The majority of the island's soil types are suitable for vegetable production. These soils are moderately acid (ph 5.0-6.5), have a good moisture holding capacity and moderate to good internal drainage.

Topographically, less than 10% of Grenada's agricultural lands are ideally suited for vegetable cultivation. Currently, most vegetables are produced in small patches of available flat and slightly sloping lands. Hillside vegetable production is also undertaken, but with serious soil erosion consequences.

Mindful of this, the Ministry of Agriculture (MOA), through an FAO project (1976-1983), sought to demonstrate the necessary practices related to hillside vegetable cultivation. The Project established a 50 acre hillside agricultural demonstration farm in the south of the island. Unfortunately, the practices developed on that farm have not been extended to farmers due to lack of involvement of the extension service.

Cabbage and calalloo seem to be least affected by the local ecological conditions. Production during the wet and dry seasons is concentrated in the drier and wetter areas, respectively.

Pumpkin and eggplant are produced mainly in the lower rainfall areas during the wet and early dry seasons (June - February).

Carriacou, Grenada's island dependency, has favourable ecological conditions for cultivating most vegetable crops. It has a total land area of only 8556 acres (about 11% the size of Grenada), and therefore has a less varied ecological environment. Its rainfall, like that of Grenada, is poorly distributed. Vegetables can be extensively produced during the wet season. However, very little is currently produced.

Even with irrigation, dry season vegetable production would be difficult because of the tradition of farmers letting loose their animals during the dry (let go) season.

Petit Martinique, another island dependency, is only 500 acres in area. It has very little vegetable production activities and capacity.

3.1.3.2 Pre-production

The vegetable producer generally has little or no choice in selecting production sites. He may have very limited land, or most of his land may already be cultivated in permanent crops. Available sites are sometimes shady or bouldery, or the soil may be too heavy for successful vegetable production. Sites are often located long distances away from suitable water sources.

Except for pumpkin, all vegetables under consideration are planted in pure stand on separate beds or in small patches. Pumpkin is planted among fruit trees and other tree crops. On some farms, especially those in close proximity to dwelling houses, pumpkins are produced from volunteer plants.

Seeds of a wide range of vegetable cultivars are purchased by individual farmers from local farm shops located mainly in the south (St. George's) and east (Grenville) of the island. Small quantities (usually less than 1 ounce) are purchased. Vegetable cultivars currently available are shown in Table 3.1.3.2-1.

There are two major local vegetable seed importers. However, a few farmers purchase seeds from Trinidad, through local "Traffickers". Usually, seeds purchased from Trinidad are of locally unavailable cultivars about which farmers have obtained information through "Caribbean Farm News", or agricultural radio programmes, or technicians employed by locally based external agricultural agencies. Vegetable seeds (usually of new cultivars) are sometimes imported by agricultural agencies for testing and commercial purposes. However, there is very little documentation on the performance of cultivars introduced and tested by such agencies.

Poor seed quality is a critical problem. Seed viability is not guaranteed by farm shops retailing seeds. Failure of seeds of a particular cultivar to produce fruits true to type is also a major problem which, although of litle significance on the local market, ruined Grenada's eggplant export trade in 1983 when the purchased cultivar (Black Beauty) produced mainly atypical fruits.

Farm shops re-pack seeds (for retail purposes) in inappropriate packages - paper envelopes. Their storage

conditions are also less than ideal. Most small vegetable producers lack refrigerating facilities, and therefore experience problems in storing unused seeds.

Recently, the Mirabeau Agricultural Station (MAS) began producing vegetable seedlings for sale to farmers. Crops involved are:

a. Tomato
b. Eggplant
c. Cabbage
d. Sweet Pepper

The MAS also offers facilities for testing and treatment of vegetable seeds. However, these facilities are rarely used by farmers who apparently fail to appreciate the significance of viability testing and heat treatment of vegetable seeds prior to planting.

3.1.3.3 Production to harvest

Farmers produce vegetable seedlings on unsterilized seedbeds. Pumpkin seeds are sown directly in the field. Callaloo is the leaves of the dasheen plant which is cultivated from suckers (side shoots) arising from the dasheen corm. Suckers are left in the ground after the dasheen corm is harvested. These are used for subsequent plantings. New calalloo producers obtain planting materials free of cost from established dasheen producers. There are no dasheen nurseries on the island.

Vegetable farmers are generally not selective in the quality of planting materials used. This may be a major reason for poor crop yields.

Land clearing, soil preparation and vegetable planting are generally undertaken in quick succession -sometimes the same day. This is especially true in the case of part-time vegetable producers. Land preparation activities are thus inadequate.

Land preparation is mainly manual. Soil tilth is usually inappropriate to the crop being planted. Failure of farmers to treat soil (where necessary) against dangerous soil-inhabiting insects (cutworms and mole crickets) and nematodes has resulted in poor crop performances.

Inappropriate timing of fertilization, and excessive weed competition adversely affect crop productivity. Initial fertilization is delayed until 1-2 weeks after planting/transplanting, and the type of fertilizer used is not based on any scientific determinations. One of two fertilizers is used: either the "cocoa fertilizer" (N.P.K.- 16.16.16) or the "banana fertilizer" (N.P.K.- 12.8.24),

depending on availability. Nitrogen (Sulphate of Ammonia) and phosphate (Triple Superphosphate) straights are available, but are rarely used by farmers. The Ministry of Agriculture's Soil Testing Laboratory can be utilized to a greater extent to determine proper fertilization routine based on soil chemical analyses. This service should be promoted by MOA's Extension Service, and should be used as a basis for encouraging farmers to improve their fertilization regimes.

Weeds (especially nutgrass) are a serious problem in vegetable production. Control measures are mainly manual. Pre-emergent herbicides are very rarely used. Weed control, especially during the wet season, is usually the single most costly production input for most (if not all) vegetable crops.

The majority of vegetable plots are without irrigation facilities. A few depend on domestic water source (using rubber hoses and sprinklers) which is generally unreliable - especially in the south of the island. Because irrigation water is inefficiently used, most farmers consider irrigation with domestic water too expensive. Through the Agricultural Rehabilitation and Crop Diversification Project (ARCDP) and Caribbean Agricultural and Rural Development and Advisory Training Services (CARDATS), separately, about ten vegetable farmers have recently secured loans from the Grenada Development Bank (GDB) to purchase irrigation equipment for use in crop (including vegetable) production.

Most vegetable crops under consideration are affected by a number of pests and diseases. Farmers rely almost entirely on chemical control. They however lack the necessary knowledge and guidance concerning pesticide usage. Pesticides often prove ineffective because of inappropriate usage. Many pests have apparently developed some degree of resistance towards certain pesticides. Entire cabbage crops are often destroyed by pests (mainly diamond back moth) in certain locations-especially the estern part of the island. Bacterial rot in cabbage is also a major problem throughout the island. Mites and bacterial wilt disease are causing severe production losses in both tomato and eggplant. Early blight disease in tomato is also a problem during the wet season. The major disease affecting carrot production is soft rot. There are no serious pest and disease problems affecting pumpkin and calalloo production.

Except for carrot and pumpkin, vegetable crops under consideration are harvested from as early as 10-12 weeks after planting, depending on the cultivar used. Pumpkin and carrot normally mature at about 14-16 weeks after planting, but some farmers commence harvesting as early as 12 weeks.

All locally grown vegetables are harvested manually. Simple and effective harvesting techniques are used. Eggplant,

cabbage, pumpkin and calalloo are harvested by means of a sharp tool (knife, secateur, or cutlass). Carrot tubers are uprooted by hand after the soil is loosened with a fork (if necessary). Tomatoes are picked (several) from the fruit stalk (by hand) at the point of least resistance. Generally, utmost care is taken during the harvesting process. With regard to carrot and pumpkin, determination of the correct maturity stage for harvesting seems to pose problems.

From experience, farmers have learnt that their vegetable crops should be harvested either late on afternoons or early on mornings. This is not observed in the case of carrot and pumpkin.

Yield data for vegetable crops are available for 1986 only (Table 3.1.3.3 1). According to the data, vegetable crop yields are low. It is possible to increase these yields by at least 50 percent even with the limited technology now available to local producers.

3.1.3.4 Postharvest Handling

Immediately after being harvested, certain vegetables (tomato and eggplant) are placed in firm containers-baskets and field boxes. Calalloo is wrapped in sheets of plastic or green banana leaves. Other vegetables are placed in jute or plastic sacks.

On-farm storage is rarely needed. Harvested vegetables are quickly moved from field to farmer s home or farm house-; mainly on head where the necessary washing and grading operations are undertaken. The stringency of the grading process depends on the intended market. Generally, produce to be sold at the village and municipal markets are not graded, and in times of produce scarcity "good" and "poor" quality are mixed prior to being offered for sale. Such produce are usually sold by the "heap" or "bundle" (in the case of callaloo). Produce destined for hotels, supermarkets or the Marketing Board are graded to the best of the farmer's ability.

Except in the cases of pumpkin and unripe tomatoes, only overnight storage by the farmer is necessary. Vegetables may be kept overnight in cardboard cartons and plastic field boxes. For overnight storage, calalloo is left in the same material with which it was wrapped in the field. Unripe tomatoes are placed in cardboard cartons and covered until ripe. Pumpkins may be stored on wooden floors (in store rooms) or in large open containers for periods of up to six months. Because of the prevalence of praedial larceny, pumpkins are not left in the field after they are mature. On the contrary, farmers tend to harvest pumpkins before they are adequately mature.

Transportation to various market outlets is mainly by private pick-up trucks. There are very few passenger buses capable of transporting agricultural produce. The MNIB operate a collection depot on the eastern side of the island. Vegetable (and fruit) producers in that location are therefore relieved of the problem of transporting produce to St George's. MNIB also collect produce at farm gate based on farmers' requests. This latter service has proven to be extremely costly to the MNIB. Itinerant buyers (Hucksters) also purchase vegetables at farm gate. In this case, produce is transported, either on head or on pick-up trucks, to the Hucksters home where the final grading and repacking are undertaken.

3.1.3.5 Final Demand

With the exception of eggplant, vegetables under consideration have a strong local demand. Tomato is always in short supply especially during the latter half of the year. Carrot is imported (Table 3.1.3.5-1) to supplement local production. Pumpkin can be considered a staple vegetable. However, relatively large quantities are exported, mainly to Trinidad (Table 3.1.3.5-2). Exports of eggplant (1980-1983) and callaloo (1985) have been encouraging, and plans are being developed to expand exports of both commodities.

Market prices of any single vegetable commodity may vary widely, even within the same geographical location. Vegetable prices at the village and municipal markets can be very erratic. Those at the MNIB are generally the lowest. Supermarket prices are usually higher than the MNIB's, but lower than the village and municipal markets'.

Although the MNIB and supermarkets rarely accept poor quality produce, premium prices are not offered for high quality vegetables.

Vegetable prices are always highest during the period November to January when there is traditionally an apparent scarcity of most vegetables.

Average vegetable prices during the past five years (1982-1986) are shown in Table 3.1.3.5-3. Overall, these prices have shown only modest increases over the period, and some commodities have shown an actual decrease over time.

3.1.3.6 Institutional services

3.1.3.6.1 Research/Extension

Vegetable crop research is the responsibility of the Ministry of Agriculture (MOA). However, because of the Ministry's lack of research capability, vegetable research activities are minimal. Local vegetable production is based

mainly on farmers' traditional methods and experiences. Only limited quantities of high quality vegetable seedlings are produced at the MAS.

In 1980, CARDI developed a Primary technological package for Eggplant Production in Grenada. This was very useful but no further work has since been done by CARDI on local eggplant production.

The French Mission for Technical Cooperation conducted a series of on-farm testings of tomato cultivars in the south-western farming district during the period 1982-1985. A document "Guide to Tomato Production" was subsequently published.

During the past two years (1986-1987), an Israeli Consultant, working for the Agricultural Rehabilitation and Crop Diversification Project (ARCDP), generated much technological information on tomato and eggplant production. Along with a local Counterpart, he directly assisted twenty vegetable producers, and has reached larger numbers of other vegetable producers through the MOA's Extension Service.

3.1.3.6.2 Credit

Credit for vegetable production is available from the Grenada Development Bank (GDB), Credit Unions and Commercial Banks (mainly Barclays). However, vegetable producers are making very limited use of available credit. Lack of required collateral is the main reason advanced by most farmers for not using credit.

3.1.3.6.3 Processing Facilities

Locally produced vegetables are not processed. They are consumed as fresh vegetables. Recently, a local small entrepreneur has begun packaging callaloo (in chopped form) for sale to local supermarkets. Also, the Produce Chemist Laboratory has conducted trial runs on pumpkin nectar.

3.1.3.6.4 Marketing

Marketing services are provided by (a) The Ministry of Agriculture (MOA), (b) The Ministry of Trade, (c) The Marketing and National Importing Board (MNIB) and (d) Hucksters.

MOA maintains contact with vegetable farmers through its Extension Service. It also collects information on production, exports/imports and prices of vegetables, and produces a weekly/fortnightly news of vegetables on the local market.

The Ministry of Trade issues licence to persons wishing to

import vegetables. This is done in consultation with the Ministry of Agriculture.

M.N.I.B. purchases, retails and exports vegetables. It is however inadequately equipped to handle large quantities of vegetables. It has limited storage facilities. Additional storage and handling facilities are expected to be installed under the current Agricultural Rehabilitation and Crop Diversification Project (ARCDP) funded by the World Bank.

3.1.3.6.5 Transportation

Only the MNIB operates a transportation service for moving vegetables. A weekly service is operated to move vegetables to St. George's from a collection point (depot) on the eastern side of the island. A limited ad hoc service for making farm gate purchases is also operated.

Many hucksters and some farmers own pick-up trucks which are used to transport vegetables from field to home and then to market. Others transport vegetables on head (from field to home) and then by passenger buses or hired pick-up trucks (from home to market). Buses are unable to accomodate large volumes of produce.

3.1.3.7 Main Constraints

3.1.3.7.1 Preproduction

(a) New vegetable cultivars are imported mainly on the basis of their performances in temperate and sub-tropical countries. No one assumes responsibility for testing new cultivars and adapting the new technology to suit local conditions. As a result, farmers have no alternative but to use unvalidated technology. The consequences are often economically disastrous.

(b) The majority of locally available tomato cultivars set fruits unsatisfactorily during the wet (hot) season during which time most vegetable species perform poorly mainly because of severe disease problems.

Wet season performance of two recently introduced tomato cultivars is encouraging, but seeds are scarce and expensive.

(c) Because of its inconvenient location and the lact of awareness among farmers, government's vegetables seed testing facilities at Mirabeau are grossly underutilized. However, farmers continue to complain of unsatisfactory seed germination and the prevalence of seed borne diseases such Black Rot in cabbage, Early Blight in tomato and Alternaria Blight in carrot.

(d) Supply of vegetable seedlings by the Mirabeau

Agricultural Station is far below current demand. The majority of vegetable farmers must therefore continue to rely on seedlings from their untreated nurseries. As a result, unhealthy seedlings are often planted, and ensuing crop yields are depressed.

5.1.5.7.2 Production and Marketing

(a) Grenada has only a small proportion of bona fide vegetable producers. The majority treat vegetable production as a secondary activity to which minimal time and effort are devoted. They have limited contact with agriculture extension agents and are therefore left lagging in terms of technology.

(b) MOA's lack of research capability and CARDI's concentration on non vegetable crops have adversely affected the process of vegetable production technology development validation.

CARDI's operations in Grenada during the past decade have resulted in a technological package for eggplant (October, 1980). Other major vegetable crops have only recently (1986-1987) been given some attention through the Israeli (Agridev) Mission operating in support of Grenada's Agricultural Rehabilitation and Crop Diversification Project.

(c) The majority of vegetable farmers are without irrigation facilities and therefore do not cultivate vegetables during the dry season for fear of total crop failure. Others depend on the domestic water source for irrigation. This source, apart from being relatively expensive (1 cent per gallon of water used), is unreliable during the dry season when it is most needed.

(d) Grenada's soils are generally known to be low in available Phosphates (P), yet most vegetable farmers use a low-phosphate fertilizer (N:P:K-15:8:24) which is most easily available at reasonable prices. Fertilizers specifically suited for vegetable production are unavailable locally.

(e) Although pests and diseases are one of the major vegetable production constraints, there are no related control programmes. Moreover, agricultural extension agents are inadequately trained to assist vegetable farmers in overcoming pest and disease problems.

(f) Despite significant changes in vegetable production levels during the year, local market prices are constantly high and show only marginal changes. This tends to create artificial gluts which discourage further increases in areas cultivated.

Because market prices bear little relationships to production costs (unknown in most instances) or market demand, local vegetables become uncompetitive with imported vegetables (e.g. carrot and tomato) for which import licenses are granted during periods of scarcity. Additionally, the uncompetitive pricing of local vegetables is adversely affecting development of the vegetable export trade.

3.1.4 Fruit tree crops

There is a wide range of tropical fruit species that can be found in Grenada. Among the most common are Citrus (Citrus spp), including Oranges (C. sinensis), Grapefruits (C. paradisi), Limes (C. aurantifolia),etc; Avocados (Persea americana); Breadfruit (Artocarpus altilis),; Mangoes (Mangifera indica); Coconut (Cocos nucifera); Soursop (Annona muricata); Sugar apple (Annona squamosa); Sapodilla (Manilkara sapodilla); Guava (Psidium guajava); Tamarind (Tamarindus indica); Pawpaw (Carica papaya); W.I. Cherries (Malpighia glabra) and Golden apples (Spondia cytherea).

In spite of a relative high population of these fruit trees there is no pure stand Orchard in the island. They may be found scattered islandwide as isolated trees, but most frequently in mixed orchards intercropped with Bananas, Nutmeg or Cocoa. In some regions they may form part of a multicropping system associated with Food Crops.

Fruit trees represent a good alternative within the Agriculture diversification programme in Grenada for the following reasons:

a. The topography of most areas in the island limit the possibility for the cultivation of most annual crops. The steep topography of the island require conservation of its soils for which perennial trees are ideal.

b. Fruits present export potential with high possibilities to contribute to alleviating the foreign exchange deficit.

c. The fact that Grenada has been declared fruit fly free puts the island at a great advantage with respect to other producers in terms of direct access to markets such as the USA fresh fruit market.

d. Grenada is one of the countries favoured by the Lome convention and the CBI which allow export to EEC countries and into the

U.S. under preferential treatment.

e. In general, costs of production are competitive with those of most caribbean countries.

f. The proximity to excellent markets such as USA and Canada represent an advantage as compared with other major producing countries such as Israel and the ASEAN countries.

3.1.4.1 Ecology

The environmental factors of Grenada are presented in Chapter 2 of this document. Among those which more commonly determine the suitability of a given area for fruit production are soil and climate. However, in Grenada, the slope of soils and humidity are more critical factors.

Of the four most common soils in the Island only one, Perseverance clay, is unsuitable for fruit crop cultivation. This is mainly due to the very poor internal drainage and the high moisture retention capacity of these soils.

According to the land capablity study (see Chapter II) the drier conditions (Region 1) occurs in small areas located at the North East corner of the Island in a narrow patch, and around the south coast, south west of Point Salines. The central part of the Island, a large mountainous area surrounding Grand Etang comprise the wetter region (Region 5). Ecologically, this division of the Island is important in determining the adaptability of a given crop. Table 3.1.4.1-1 present the recommended production environment for a number of tropical fruit commodities. Among those crops requiring a dry season in order to perform better are: Mangoes (4-6 dry months), Cashew (2-3 months) Some citrus eg. limes (2-3 dry month), Grapefruit (2-3 dry months) and Oranges (3 dry months); W.I. Cherries (Alternate wet & dry seasons) and Passion Fruits (Alternate Wet & Dry).

Avocado, guava, pawpaw Sour sop, Assean fruits, Carambola, Sapodilla and Macadamia nut do not require dry season. With the exception of Guava and Mangosteen trees (one of the Assean Fruits), which can support several months of drought, most of these crops will suffer if submitted to continuous dry season for over 1-2 months.

In general the topography of Grenada is so irregular that its territory is divided into 71 district catchment basins offering a diversity of microclimates. Therefore there is ecological potential to grow most of the tropical Fruit Crops but a detailed zoning might be needed to guarantee success.

3.1.4.2 Preproduction

The propagation of fruit trees is carried out at only one location: the Mirabeau Agricultural Station. This station is well equipped with all propagation facilities. There are no private nurseries involved with propagation of fruit trees, possible reasons are the high subsidises paid by the Government and the small market size. While 3 other propagation units exist, they are fully dedicated to nutmeg and/or cocoa.

At the Mirabeau Nursery, ornamentals, fruits and vegetables share the propagating facilities in a proportion of 50%, 40% and 10% respectively.

a. Supply and Demand and Distribution of Plants

Normally, fruit trees are requested by farmers through the respective District Extension Officer from whom appropriate application forms are obtained. The completed forms are then returned to the officer who may add his comments before passing them to the propagation station. The closing date for submitting these forms is December 31st, each year. In theory, the nursery will use these forms to make the propagation plan for the year but in practice this is not working properly since most requests are not submitted on time. Generally the person in charge of the unit makes the propagation plan based on the following:

i. Rootstock and number of plant available at the moment.
ii. Scion availability, time of availability vis-avis rootstock readiness.
iii. Demand for plants on previous years.

Citrus, mangoes and avocadoes are the fruit species most demanded. Traditionally the demand for mangoes has been higher than the supply. However, this year (1987) due to a sharp increase in the number of mangoes propagated, it has been the opposite. Citrus and Avocado trees, that traditionally were in excess supply, last year (1986) were short in meeting the demand by farmers. The fact is that in general, the planning process is still deficient due mainly to the late feed back from the district extension officers.

Table 3.1.4.2-1 present the number of plants propagated and the number of plants sold over the period 1981 - 1987.

Since Mirabeau is the only nursery propagating fruits, farmers sometimes have to come from far away to collect their trees. The Extension Officer sometimes assist the farmers by arranging the transport of the plant from the nursery to the farm. Recently, a truck has been made available to the nursery.

The price of the plants at the nursery is subsidised by Government. Although the operation costs for the nursery is relatively low when compared to other countries in the region, total costs can be significantly reduced through better planning.

Table 3.1.4.2-2 summarizes the prices of fruit trees at the Mirabeau nursery and the estimated cost of production in 1986. Wages increased by 10% since then, while inputs have risen by approximately 8%. However, the prices of fruit plants at the nursery remained the same.

In Table 3.1.4.2-1 it can be observed that the total production of fruit plants has been haphazard since 1981. Although production has decreased by more than one half in the time analysed, it has picked up again in 1987 and by October this year, over 21 thousand plants had been propagated. It is also important to notice the large difference between the number of plants propagated and the number sold each year. It must be assumed that many plants have been distributed each year without properly recording the sales or records were lost. The fact is that, at least for the past six years, a significant number of fruit plants have gone unaccounted for.

i. Propagation Methods

While citrus are propagated by "T" budding, mangoes and avocadoes are grafted; Soursop, guava, cherries and french cashew are propagated by cuttings and most other fruit species are being propagated by seeds. Percentage of bud take is considerably lower during the rainy season for citrus (40%), mangoes (60%) and avocadoes (40%), than during the dry season (80%, 80% and 70% respectively).

ii. Sources of Planting Material

SEEDS:
While seeds for most species are obtained from fruits coming from their own museum, there is a major problem with avocado. Avocado seeds used at the nursery are bought from any person that brings them to the station.

For mangoes, rather than the seeds, volunteer seedlings which appear growing under adult trees are dug out, potted and used as rootstocks.

BUDWOOD:
Budwood for most fruit species utilized in the propagation process come from their own museum plots. These museum plots, however, receive very little care, hence their condition is quite poor. The citrus museums for instance, are over-whelmed by multiple pests and diseases. On the other hand there is no virus free plot, and the procedures to collect the budwood and even the propagation process may

lead to contamination since tools are not sterilized.

There is a shortage of avocado and mango budwood. In the case of avocadoes this is mainly due to the decline of most plants at the museum as a result of a heavy infestation of Phytophthora cinammoni. A new museum has been recently established but even there the management is very poor. The mangoes on the other hand have grown so high that the practice of preparing and then cutting the scions has become a cumbersome operation. Recently an expensive hydraulic lift mounted in the back of a truck was bought for helping this operation. However, in economic terms, its use is questionable.

iii. Species and Cultivars Propagated

Traditionally, mangoes, citrus and avocadoes have been the fruit species propagated in larger quantities at the nursery. Julie followed by Graham and Ceylon have been the most demanded and propagated mango cultivars.

Local avocado clones have always occupied the first place in quantity propagated while Parson Brown has out numbered other orange cultivars. Marsh seedless has been the most popular grapefruit cultivar while West Indian has been the most popular limes.

Table 3.1.4.2-3 present the most important fruit cultivars being propagated and planted in Grenada.

3.1.4.3 Characterization of Fruit Crop Production

With the exception of Bananas, Fruit Crops in Grenada are scattered Island wide and most of the time mixed with other crops. Multicropping systems including fruit trees, tree crops and food crops are common, bananas, cocoa and nutmeg being the main crops within the systems. The association of fruit trees with food crops and vegetables is more common in small farms. This is particularly true in the Northeast and Southwest parts of Grenada which coincide with the driest regions in the country. In the moderate to high rainfall area, a wide range of fruit species including mangoes, avocadoes, goldenapples, some citrus and guavas are found intercropped mainly with cocoa and bananas. However, in the highest rainfall areas multicropping systems include nutmeg as the major crop intercropped with citrus, bananas and cocoa. The 1982 Agricultural Survey reported an average of 0.34 acres of fruit crops (excluding bananas) per farm and a total of 28825 acres. Of these, 25% were on small farms, 41% on medium and 34% in large farms. Average acreage for small medium and large farms were 0.12, 0.51 and 2.46 acres/farm respectively. This gives an indication, not only of the small size of plots and number of trees per farm, but also how scattered fruit trees are in Grenada.

3.1.4.4 Production and harvesting

Due to the small number of trees per farm and their scattered nature, establishment and management practices for fruit crop production are quite deficient in Grenada. The fact that there are no commercial ochards of non banana/plantain fruit trees in Grenada, has made more difficult the development and introduction-validation of technological packages for proper management of these crops.

Cultural practices in fruit crops can be considered marginal. When they are intercropped with major cash crops, such as bananas, they indirectly receive the benefits from the cultural programme oriented to these major crops. The beneficial effects of intercropping are nutritional, weed control and eventual pest and disease control. However, there also are negative effects in the intercropping systems as found in Grenada. Some of them are: shading, space and nutrient competition and herbicide drifting. Of all cultural practices, the spray programme for control of pests and diseases is the most deficient. More recently however, the MOA through the Tree Crop Diversification Project has established a service for spraying mangoes to control anthracnose.

Harvesting of fruits is a key operation affecting the final quality of the product. In Grenada, while some new systems such as the use of pole/cutter/sock, V-pole/push/twist and hooked stick/pull method are recently being introduced and tested, the traditional climb/pick/throw method continues being the most commonly used among most farmers. More recently with the increasing demand for certain fruits for the export market and the requirement for better quality, the practice used for harvesting in Grenada is directly related to the intended market. In other words, if the product is to be sold in the local market farmers are not as concerned about bruising as they are in minimizing the harvesting costs. Of course, improper harvesting procedures result in greater post harvest losses.

3.1.4.5 Post Harvest & Handling

Many of the postharvest losses of fruits in Grenada have their origin in the mishandling of the product during production and postharvest handling. Of all the fruits exported from Grenada only banana has a well organized post harvest systems oriented toward product quality. In the case of non-banana fruits, exporters tend to apply the minimum post harvest handling practice required. Although quality is not excellent the method works since most of the extraregional exports are currently destined to ethnic markets in the UK or Canada. If the attempts to reach non-ethnic markets succeed the postharvest treatment being used will be in many cases below required standards.

Other than bananas, breadfruits and mangoes are the two fruit crops where significant improvements are being introduced in post harvest treatment and handling, even though they are a long way from being considered efficient methods. However, exporters are aware of conditions required in their respective markets and as the demand increases, could be properly trained in methods already proven to be economic.

In general, post harvest handling infrastructure is insufficient. However, the international airport has two chill units and four freezer units that for a long time remained unused. These have recently been rented to a private company.

3.1.4.6 Supply and Local Demand

a. Supply

Reliable statistics on total production, acreage and yields are extremely scant. Some reports exist but tend to be contradictory or outdated. It is recognized however, that the nature of scattered and mixed planting systems make more difficult the establishment of a reliable information and reporting system on fruit crop production.

The last agricultural survey in Grenada was conducted in 1982. It reported a total of 2825 acres of tree crops excluding cocoa, nutmeg and bananas. This represent an average of 0.34 acre per farm. According to the same survey the five predominant species were coconut (58965 plants), plantain (36044 plants) soursop 16278 plants, avocadoes 14060 and oranges 12863 (Table 3.1.4.6-1) Citrus, if considered as a group, comes only third (34472) plants after plantain. In terms of production, data from the agricultural survey shows that the five species with highest total production were golden apples, 1869.63 tonnes, coconut, 1415.16 tonnes, grapefruit, 922.27 tonnes, avocadoes, 804.31 tonnes and mangoes, 770.91 tonnes. Once again citrus if considered as a group, come second (1806.29 tonnes) just after golden apples. (Table 3.1.4.6.-1).

An analysis of the yield/tree (total production-number of bearing trees) shows that the yield of mangoes, avocadoes, coconut, soursop and papaya are about average yield in other major producing countries. Yields for oranges, grapefruits, limes and guava are however considerably lower. Golden apple yields per tree is higher than the average yield for most producing countries.

Table 3.1.4.6-2 summarizes the estimated production of selected fruit commodities for the period 1980 - 85 as prepared by the statistical section of the MOA. An analysis of these data show the great difference with respect to the agricultural survey. Mango production, for instance, is

reported to be approximately 3 times higher than the report of the agricultural survey in 1982. Production data for most other fruit crops are reported to be, at least, 1.5 to 2 times higher by the statistic section than the data from the 1982 agricultural survey. A similar situation happens when this data is compared with the BDD report. (Table 3.1.4.6-3).

Due to the yearly planting of these species the supply of fruits in Grenada is markedly seasonal. Bananas, pawpaw and plantains being the exception, since they are available year round. Supply of pawpaw, however, is found to be limited in quantity. Table 3.1.4.6-4 shows the seasonality of selected fruit species in Grenada.

b. Local Demand

Grenada population was estimated to be, by 1986, in the order of, approximately 97 thousand 1/. As with supply, reliable data on demand is very scant. The Food and Nutrition Surveillance System has prepared some data on apparent comsumption that seems to be the only one available at the moment (Table 3.1.4.6-5). However, data presented is contradictory to export figures.

3.1.4.7 Processing

There are thirteen (13) Agroindustries in Grenada, six (6) of which include fruits in their processing operation. Four of these are home industries the other two being cottage industries. Most of these industries have inadequate facilities in terms of space, infrastructure and equipment.

Fruit products from these industries include candied pawpaw; cashew, cherry and plum wines; grapefruit and orange juices; grenadines orange and nutmeg syrups; guava and nutmeg jams; guava jelly; mango chutney and mixed fruits.

While the installed capacity is relatively small it seems it is not being fully utilized. However, the potential for processing the fruits currently available in this island has not yet been fully explored.

3.1.4.8 Main Constraints

3.1.4.8.1 Preproduction

a. The system of distribution of fruit trees now in use, is delaying rather than promoting the process of planting. There is a lack of

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(1)Source: Food & Nutrition Surveillance System. Crude Estimates of Food Availability, Grenada 1986 Grenad Food and Nutrition Council.

coordination between farmers, the extension officers and the person in charge of the nursery.

For this reason, many fruit plants have to be re-potted, or sometimes dumped, while there is deficit in the propagation of others.

b. The fact that Mirabeau is the only nursery which supplies fruit plants makes it difficult for farmers living in distant areas from this location. It then makes distribution a slower and more costly operation.

c. Due to the pressure of the farmers the nursery is releasing plants, particularly citrus, at a very young age. A high percentage of these plants die soon after planting because required attention is not provided either because farmers cannot do it, or are ignorant of what is to be done. The plants that survive, have to be pruned to eliminate the lower branches to facilitate cultural practices. Farmers are not trained to do this delicate operation. If these lower branches are not pruned, later, because of the weight of the fruits, they will touch the soil facilitating the infestation by pathogens of the fruits and/or the branches. The market potential of these fruits is then reduced and the whole tree suffers.

d. Rather than guaranteeing the cleanliness of the plants sold to the farmers, the nursery at Mirabeau might be contributing to the dissemination of major problems. Many practices in use by the nursery are facilitating the contamination by pathogens of the plants being propagated. Some of these problems are not noticeable while the plant is at the nursery, but they will show up later in the field. Specific examples of these malpractices are the following:

-The soil media or potting mixture is not normally sterilized leading to the possibility of contamination of the plant or the seeds potted.
- The nursery buys avocado seeds for use as rootstocks. This practice is known to be the most common way of introducing foot rot into the nursery and later into the farms.
-The sterilization method used for avocado seeds at the nursery is not being effective in the control of Phytophthora cinammomi, causal agent of the foot rot disease in avocadoes.
- The possibility that Citrus Tristeza and other viruses might be present in Grenada,

has been suggested. In spite of that, the methods used to collect budwood may be leading to contamination. Propagation tools are never sterilized and there is no virus free plot established. Also, most of the citrus trees are being propagated on sour orange rootstock which is succeptible to Citrus Tristeza Virus. The only other stock being used is the Rangpur lime and it is used in a very limited amount.

e. The total percentage of take for budding or grafting citrus, mangoes and avocadoes can be considered low (40-80%, 60-80% and 40-70% respectively). The lower percentage is for the rainy season when the material for budwood is too young and/or too old for the traditional methods of propagation being used.

f. Because of the poor condition of all the museum plots there is a significant shortage of clean planting material for propagation. The situation is particularly critical in the case of avocadoes where most of the plants in the old plot are in an advanced stage of decline because of Foot rot. While a new avocado plot was recently established, current poor management practices being applied unless upgraded, will lead to the same problem now facing the old plot.

g. The current system might be contributing to a future glut in the production of avocadoes during a specific and short period of time by placing too much emphasis to the propagation of a reduced number of local avocado selections. These local selections, by the way, have not yet been fully characterized. Extraregional markets such as Europe and U.S.A. are more open to well-recognized, late and early, cultivars which can be grown in Grenada.

3.1.4.8.2 Production and others

a. With the exception of a new mango spraying programme, all cultural practices are marginal or non existing.

b. No technological packages have been developed, or validated.

c. Deficient intercropping system where competition for light, nutrients,etc. is generally allowed.

d. Inadequate training of extension agents in fruit crop production limit the assistance they can

provide to the farmers

e. Lack of commercial orchards due to poor promotion and poor marketing channels.

f. Lack of experience on complementary irrigation in dry areas which limits the use of available land in these areas.

g. Concentration of production mainly due to the lack of late and early bearing cultivars.

h. Emphasis has been placed only on traditional crops Unexplored possibilities to diversify with currently neglected or new potential crops with relative known good external markets.

i. High variability in the overall fruit quality (size, color, shape, brix, etc.) of the fruit species currently available and existence of a large quantity of seedling trees with little or no commercial value.

j. High number of declining fruit trees and lack of rehabilitation programmes.

k. Deficient harvesting methods for most fruit species.

l. High postharvest losses as a result of mishandling of produce during production and post harvest handling.

m. Unexplored potential for processing currently available fruit crops

n. Lack of reliable information on acreage planted, yield, total production, and others, needed for better planning.

2.1.5 Livestock

Traditionally livestock has been considered a secondary subsystem within the mixed cropping system that has predominated in Grenada. A few small livestock farms were established at Beaulet, La Sagesse, Lance Aux Epines, Woodland, True Blue, Point Salines and the Government Livestock farm at Mt. Hartman. Until 1970 Government had a dairy farm at Westerhall for milk and butter production.

According to the latest Agricultural Census, of a total of 8112 farmers, 2511 owned livestock, Eighty five percent of them were in farms of less than 5 acres in total size. Although they are distributed around the island, there is a

concentration of farms with livestock in the East and West of the Mid southern part of the island.

In these areas, as well as in Carriacou, flatter land, along with adequate rainfall (50 - 100 inches) produce, at least during the wet season, a good amount of pasture.

Livestock numbers per holdings have remained very small, between 2 and 10 heads of all categories and species. The average number of cattle and goats tends to be around 3-4 per household, while the average number of sheep and pigs is around 6-7 per household. Livestock production in Grenada still is of the subsistence type, where milk, meat and eggs are produced mainly for home consumption, and only the excess is sold among neighbours in the village.

With the exception of egg production, Grenada is far from self sufficient in animal products. According to a CARDI report (1983), Grenada covered 50% of its lamb demand, 41% of beef demand and 38% of pork demand. In the case of sheep and goats, Grenada has been exporting substantial numbers to Trinidad (Table 3.1.5-1).

Analysing figures in Table 3.1.5-2 it can be seen that the trend of the livestock population has been erratic and a tremendous drop in the total number of heads is reported in 1982.

The contribution of livestock to GDP has been low (1%). However, it is considered that this figure is underestimating the importance of the sector in terms of potential. In effect, if one analyses the evolution of imports of livestock and of livestock products it appears that as consumption has grown, domestic production has decreased (Tables 3.1.5-3). As a result, demand has been met by increased imports, as shown in tables 3.1.5-4 and 3.1.5-5. Therefore, it can be safely assumed there is good margin for an import substitution drive in this subsector.

3.1.5.1 Livestock Production Systems

In general, livestock production is considered a sub-system within the existing agricultural production systems in Grenada. These subsystems are:

- Ruminant subsystems, including cattle, sheep and goats.
- Non-ruminant subsystems, including pigs and poultry.

3.1.5.1.1 Production resources

Given the lack of development of the livestock subsector, it is important to perform a quick inventory of the resources at hand for its development.

a. The livestock sub-systems in Grenada are found in small farms (.5 to 5.7 acres) mixed with crop systems.

b. The main source of feed for ruminants are native or unimproved grasses. However, some improved species such as Pangola (Digitaria decumbens), African Star (Cynodon phystostachyus) and Elephant Grass (Pennisetum purpureum) have been introduced in the country. Only small numbers of farmers have benefitted from these improved grasses yet.

c. Grass production is dictated by the rainfall. In the South-eastern and Western coastlands, grass production takes place only during the wet period (July to December). In the high lands, the rainfall pattern seems to be more favourable to forage production.

d. No feed-grains are produced in Grenada. By-products of farm production and imported concentrates are available to animals.

e. The main cattle breeds available are crosses between creole and Jersey or Jamaica Hope or Holstein, Brahman or Jamaica Red Poll. Sheep are all Barbados Black Belly and crosses with creole breeds. Goats are the result of crosses of Anglo-nubian or Saanen breeds with the creole population. In the case of pigs, Landrace, Large White and crosses with the creole are the main breeds. In the case of poultry, Rhode Island Red and Leghorns are the most commonly used breeds for both eggs and meat.

f. In general the labour devoted to livestock production is family labour.

3.1.5.2 Livestock production

Farmers regard livestock as a supplement to cropping activities. A description of the main characteristics of the production systems for different species follows.

a. Ruminants

Between 3-4 head of cattle are kept for meat production. Cows are milked only for home consumption. The main goal being to produce an animal to wean and fatten and be sold when it attains slaughter weight, or when extra cash is needed.

Sheep and goats are kept for home consumption also, but the Trinidad export market is also a goal for the farmer. The

farm flock is composed of about seven sheep and four goats.

The main feeds for ruminants are unimproved grasses (Antigua Hay and Savannah Grasses, mainly), crop by-products or wastes from crops. In extreme cases of drought some farmers might supply small amounts of commercial concentrates, mainly to sheep.

Usually ruminants are managed under tethered and zero grazing conditions. Tethering is used mainly during the wet season when the grass is growing and the animals find some to consume. During the dry period, animals are tied and sugar cane tops and crop by-products are cut and carried to the animals.

There are no serious infectious diseases in Grenada except for Rabies that mainly affects cattle. The disease is considered endemic in the mongoose population and control efforts have been implemented. The farmer's main problem is parasites (internal and external) for which a variety of recommended treatment are available.

Heifers are generally bred for the first time when the animal is three or more years old. Cows are bred three months after calving. Farmers either use their own bull or that of a neighbour. For sheep and goats, most farmers have their own ram. No reproductive-related problems have been reported by farmers.

Small pens constructed of wire and wood are the overnight facilities for sheep and cattle.

There is no information on productivity of livestock. However, from data gathered at some farms visited and from personal communications from technicians the following coefficients can be advanced:

Cattle
-Number of heads 4
-Milk prod./cow/day ..... 2 litres
-Lactation period (months) 5-6
-Calving rate 60%
-Slaughter Age (years) 4
-Carcass weight (lb) 350

Sheep
-Lambing intervals (months) 8
-Lambing rate 80%
-Kids/lambing 1.5
-Mortality rate
Lambs 15
Weaners 10

b. Non ruminants

In each farm with small species, on average 6 pigs and between 12 to 15 poultry can be found. Again, these animals are kept mainly for home consumption and the excess production is sold among neighbours in the village.

Poultry are generally fed with coconut, banana and broken grains obtained from commercial grain dealers. Pigs are fed from farm by-products and from household refuse (swill). Bananas sugar cane and root crops are the most common. Also, in addition to by-products, there are commercial concentrates available. A feed-mill has been opened in Grenada. Some pig and poultry farmers have been complaining concerning the price of feed.

Pigs and poultry are usually kept in small pens to protect them from other animals and theft. However the farmer exposes them to open grazing and roaming for part of the day. Feed is generally supplied to them early in the morning and in the afternoon.

The most common swine disease problems include diarrhoea and premature birth. Nevertheless, the incidence rates are very low. Poultry respiratory diseases and fowl pox are present but farmers suffer more from theft and predation than by the effect of these diseases.

In the case of poultry, farmers use their own rooster, failing which, they buy from neighbouring farmers. Generally there is more than one male for the small number of hens.

Boars are bought in the neighbourhood. Because of the small size of the operation, farmers use a neighbour's boar or one from the Government's Genetic Center which, for the past six years has been offering these services to farmers.

Pigs and poultry are backyard operations. Poultry run loose while pigs are tethered, stake-penned or penned. A small number of farmers raise poultry and pigs in small, confined units.

Basic indicators gathered for pigs are:

-Litter Size/sow	10
-Effective litter size (No. weaned)	6
-Weaning age (weeks)	8
-Fattening age (months)	6
-Fattening weight (lb)	140
-Feed Conversion rate (lb)	5.1

In general, the low productivity indicators are in accordance with the low technological levels found at the farm level. Government's efforts to improve the livestock sub-sector have been few. The Small Dairy Development

Projects at Levera and the Sheep Development Project at Carriacou as well as the Ten Year Livestock Development Plan, are some of the initiatives undertaken. IICA was requested to prepare a project for the "Delivery of Veterinary Services" which was evaluated by the Commonwealth Veterinary Association. Though recommended, it has not yet been implmented. So far the second, Sheep Production at Carriacou is the only one being implemented, although, with very little success. The actual production and productivity of the flock are low and the project has not achieved the targets established. This is attributed to poor management of the entire operation, including animal husbandry and health care.

The island of Carriacou has a good potential for sheep production, where an estimated population of 7000 sheep and 5000 goats already exists. Also there is a tradition of animal rearing and flat land available. The main constraint for animal production is the lack of water.

Landless cattle and sheep farmers also represent a problem for livestock development at Carriacou, but the existence of Government land opens the venue for the development of communal pasture lands.

3.1.5.3 Production and Estimated Demand

Athough there is no information on production of livestock and of livestock products, in table 3.1.5.3-1 an attempt to estimate demand is done. It is based on CARDI's self-sufficiency values for 1983 for the Windward Islands and on the Ministry's import figures. It can be seen that the internal market could absorb any expansion of domestic livestock production that can occur in the future.

Tables 3.1.5.3-2 and 3.1.5.3-3 present livestock prices for slaughter and breeding stock.

3.1.5.4 Marketing and Processing

As mentioned before, most livestock production, except for sheep, is aimed at home consumption, therefore little amount reaches the commercial channels and even less go for processing.

The main marketing channels are as follows:

a. Cattle: are sold on the hoof to butchers who slaughter the animals and sell the fresh meat in the public markets.

b. Pigs: Are generally sold in the villages, after home consumption has been covered. Pig carcasses, of a minimum quality, are sold to one of the two processing plants.

c. Eggs: Also, any production exceeding home consumption needs are then sold through commercial channels to supermarkets and other type of outlets.

d. Broilers: There are a few larger scale operations catering directly to hotels and supermarkets.

e. Sheep & goats: These are the only livestock that enter commercial channels, mainly for export, on the hoof, to the Trinidad market.

Processing of animals is either done at home for own consumption or in one of the two processing plants that exist in Grenada. These are producing: hams, bacon, salami, boneless shoulders, smoked chicken and corned beef. The central abattoir in town is in very poor shape and the location is not suited. A relocation is in place, if throughput is increased and justify any investment.

IV. MARKETING

4.1 Marketing Systems

There are four readily identifiable marketing systems in Grenada: that for the internal marketing of fresh produce; that for the exports of perishable produce to Trinidad; that for the marketing of traditional export crops (banana, cocoa, nutmeg and mace and minor spices and that for the extra regional exports of non-traditional fresh produce (mango, breadfruit, flowers etc).

In the case of vegetables, fruits, ground provisions, food crops and animal for domestic consumption, the marketing channels are very short with seldom more than one or two exchange of ownership between farmer and consumer. This exchange occurs most frequently at the public market place.

For exports of fresh fruit and other agricultural produce to Trinidad the channels again are very direct although complex, and in most cases the only two participants are the farmer and the trafficker.

The marketing of traditional export crops is Systematic and relatively well organized. There are clearly defined functions which include some processing. The principal participants are the farmer, some private buying/selling agents who provide an assembly service and the commodity associations or their agents.

In the case of extra regional exports of non-traditional fresh produce the channel is of recent origin and just now in the process of being developed.

4.2 Participants in the Marketing Systems

4.2.1 Farmers

The farmers of Grenada can best be characterized by the size of their holdings. In this sense they may range from the landless, who have a few head of cattle, to farmers with over 100 acres. The smallest of the farmers would have less than 5 acres of land, a few head of small animals and a few fruit trees. They most likely produce food crops, which are consumed partly by the family and the balance sold in the domestic market or to traffickers for export. Along with small volumes of low quality fruit, other small farmers maintain small stands of traditional export crops (nutmeg, cocoa, banana, minor spices) which they market through the commodity associations. Some 50% or more of small farmers income tends to be earned from non-farm sources.

Medium size farmers (2-25 acres) have scattered fruit trees

and larger stands of traditional export crops which they market through the commodity associations. They produce small amounts of food crops and market them via the traffickers or with established buyers in towns. The larger farmers are major producers of traditional export commodities marketed through commodity associations. Food crops and animals produced by these growers are normally consumed on the farm by hired workers and overseers, sold to traffickers or delivered for sale directly to hotels or supermarkets.

4.2.2 Domestic Huckster

The Domestic Huckster is usually female and may either live in St George's or in one of the rural production regions, She may handle a variety of produce (fruit, vegetables, and food crops) and tends to purchase from the same farmers (small-medium-large) and sell to the same retailers on a regular basis. The number of this type Huckster is not known but is unlikely to exceed 100 or so, given the small size of the domestic demand. In some cases the Hucksters have their own van or jeep but more frequently they use public transport (buses/trucks) to get their produce from the farm to St George's. They tend to buy small quantities of produce from small farmers on a cash basis. They often buy from larger farmers or estates on credit, making payment after selling the produce in St. George's or Grenville.

The domestic huckster has at least eight alternative markets: Municipal market retailers, supermarkets, MNIB, the tourist trade (hotels, restaurants), government institutions, household consumers, cottage industries and export traffickers.

4.2.3 Municipal Market Vendors

This vendor operates primarily out of the municipal market of St. George's as the other public markets of Grenada only function on Saturdays and have no permanent retailers. This type of vendor has stalls within the covered areas of the market place or portable stands outside where they retail produce to the consumer 6 days a week. The municipal market vendor is always female. She purchases her produce either from the domestic Huckster or directly from the farmers who bring their produce to town on Fridays and Saturdays.

4.2.4 Commodity Associations

Each Association has staff and facilities to meet their handling/marketing needs, these include buying stations, processing depots for cocoa, nutmeg and mace and boxing stations for bananas. All exports are realized or controlled by the Association.

4.2.5 Traffickers

The traffickers are large scale hucksters who "traffic" between Grenada and Trinidad and periodically to other islands, particularly Barbados. They handle mainly fruits, some root crops and vegetables and occasionally sheep. Supplies vary with seasonal production. Produce is purchased directly from the farmer, normally on-the-farm but periodically in St George's. The trafficker is the most important participant in the inter-island fresh produce trade.

4.2.6 Marketing National Import Board

This strategic governmental organization undertakes three basic marketing functions. It imports rice, sugar and powdered milk; it buys fresh produce from farmers and distributes them through three retail outlets, and it carries out experimental shipments of non-traditional produce to extra-regional markets.

4.3 Domestic Market

The urban population of Grenada represents about 35% of the total. Principal urban concentrations are in St. George's and Grenville. Imported food stuffs are commercialised through a few supermarkets in St George's and Grenville, the smaller towns and the rural areas obtaining such items through small shops. In the case of perishables (vegetables, fruits and ground provisions), the bulk is marketed through the public market in St George's, with smaller amounts moving through the markets of Grenville, Victoria and Gouyave.

Significant amounts of selected fruits, vegetables and ground provisions are marketed through the retail outlet of the Marketing and National Importing Board (MNIB) in St. George's (Young st). Small amounts are sold through MNIB depots in Carriacou and Petite Martinique. Relatively small amounts of fruits and vegetables are sold through the few supermarkets and unknown but significant amounts of vegetables and ground provisions are thought to move through the traditional urban and rural shops.

4.3.1 Public Markets

Municipal markets are the main distribution channels for fresh produce consumed in Grenada. There are 5 public marketplaces in Grenada located, in order of importance, in: St George's Grenville Gouyave, Sauteurs, and Victoria. Of these five the last four operate only on Saturdays.

The St George's central market operates six days per week, with Friday and Saturday being the principal days of

activity. When the market is crowded as many as 200 or more retailers spread into all available space in front of and around the main buildings.

Some 20% of the retailers are permanent (inside)or semi-permanent (outside) vendors. Some sell fruits and vegetables on a relatively small scale (50-100lbs). A few retailers located next to the entrance way of the enclosed structures, handle large volumes of produce, many of the inside retailers deal in dry goods. The remaining 80% of the vendors are either farmers, wives of farmers or friends or agents of farmers who bring small quantities of produce (20-200lbs) for the Saturday market.

In the 4 markets outside of St George's there are few or no permanent retailers. The number of vendors of fruits and vegetables frequenting the saturday markets are approximately as follows: Grenville 60-150, Gouyave 10-20, Sauteurs 10-20, Victoria 10-20. The number of retailers is a function of the season, and the size of the urban population.

Management and operation of the markets is the responsibility of the MOA. The Ministry of Communication is responsible for the maintenance of the buildings, the Ministry of Health for the registration of vendors of prepared food and market hygiene; the police control vehicle movement.

The majority of the produce sold in the marketplaces is fresh and of acceptable quality. Produce is not graded but sold by heap or by the unit. Price diferentials exist for different size fruits, as in the case of citrus and avocadoes, and for different cultivars, as in the case of common versus grafted mangoes.

In terms of quantities of domestic agricultural produce marketed, public markets are by far the most important. The Ministry of Agriculture estimated that in 1985 some 58% of the vegetables sold domestically (public markets, supermarkets, hotels and MNIB) were sold through the public markets of St George's and Grenville. In the case of other product groups the respective percentages are even higher, reaching 75% for fruits, 72% for plantains/bluggoes/breadfruit, 74% for ginger/seasoning/spices and 80% for root crops.

4.3.2 Supermarkets

There are five supermarkets in Grenada, four located in St George's (three within the city limits and one at Grand Anse) and one in Grenville, St Andrews. The supermarket at Grand Anse handles the largest volume of fresh produce including local fruits (citrus, mangoes, banana, plantain, papaya, sapodilla and others), vegetables (lettuce, chinese

cabbage, cabbage, tomatoes) and imported produce(onions, Potatoes, apples).

The supermarkets deal directly with farmers more so than with hucksters and although there are no formal contracts there are growers who have established relationships with supermarkets and plant their crops with these markets in mind. Occassionally supermarkets will purchase from the marketing board (MNIB), but normally only when they can't obtain the produce directly from farmers.

Delivery of fresh produce is normally done to the supermarket by the farmer in his own rented vehicle. Delivery times are normally twice weekly, falling on Tuesday and Fridays.

The type of packaging used varies with the product and whether the farmer has his own transportation or not. In general any available container may be used or they may be brought in loose with banana leaves, or other used as padding.

The supermarkets demand relatively high standards and will reject deliveries of poor quality produce but, as scarcity occurs, standards decline. Payment for produce is normally made upon delivery.

The quantity of produce sold through supermarkets is not exactly known as no precise records are kept. However, the MOA has monitored purchases of the larger supermarkets. Estimates for 1985 indicate that total sales through supermarkets was on the order of 60 tonnes. Of this amount, some 30% was sales of fruit, the balance being root crops and vegetables.

Even if these figures are underestimated the conclusion can still be reached that relatively small quantities of fresh produce reach the consumer through this channel. Although comparing the 1985 data with data from 1975, showing purchases of 50 tonnes, it seems that little growth has occured through this type outlet, as opposed to an important growth in the participation of these outlets in other caribbean countries.

4.3.3 Hotels, Restaurants and Cruise Ships

The requirements of the tourist industry (hotels, restaurants, cruise ships) for fresh produce is a function of the number of tourists visiting the island. This number has increased somewhat but not as much as expected after the inauguration of the new international airport near St. George's in march 1986 and expansion of hotel facilities.

At the present time there are a few hotels, guest houses and cottages with a total of approximately 850 rooms. Occupancy

runs as high as 85% during the winter season and 70% during the summer season for a few selected hotels. However, the annual average occupancy rate is under 50% whereas the larger hotels have full restaurant service the others only have partial food service or none at all.

Hotels, in general, purchase relatively small amounts of fresh fruits and vegetables. Purchases are generally made by farmers who deliver directly to the hotel. An idea of the volume of fresh produce sold to hotels is provided in table 4.3.3-1. One hotel with 32 rooms and relatively high rate of occupancy was found to purchase approximately 6 tonnes of fresh produce per year. At this rate, and with an occupancy of 50%/year, the industry would consume approximately 78tonnes/year. With 80% annual occupancy total annual consumption would reach some 125 tonnes. Produce consumed in largest volumes would be those fruits such as banana and pawpaw which can be produced 12 months/year. Items consumed in smaller amounts are vegetables such as carrots and seasoned fruits such as mangoes.

Given the limited passenger space on airplanes to Grenada and limited resources for promotion and development of the tourist sub-sector, the potential market for agricultural produce is in the order of 70-90 tonnes for a mixed range of fresh produce.

Of the approximately 10 non-hotel restaurants in and around St George's, only about one half cater to significant number of tourists. Since these are often from cruise ships, their consumption of fresh fruit and vegetables is not large.

Expected number of cruise ships calls is estimated at 257 during 1987. Although this represents a potential for sales of fresh produce and flowers, at the present time very little produce is actually sold to this market. Since cruise ships must have guaranteed volumes and quality it is unlikely that they will forgo the certainty of stocking supplies in Puerto Rico and USA ports.

As with supermarkets, farmers tend to deliver fresh produce to hotels and restaurants twice weekly. Individual purchases are very small, ranging from a few units to 10 - 50 lbs of any given item, Produce purchased in largest volumes is fruits (citrus, bananas, pawpaw) and root crops (tannias, sweet potatoes, yams) but even in these cases seldom do individual purchases of any one item reach 100 lb. per week. Hotels prefer to purchase locally grown items but they are limited by the seasonality of the diverse items, except in the cases of banana and plantain which are in constant supply.

4.3.4 Domestic Marketing of Fresh Produce by MNIB

The MNIB is second only to the public market in terms of

volume of fresh produce handled. Its domestic fresh produce operations are carried out by a staff of 28, including 10 persons responsible for purchasing/transport; up to 7 for product preparation and 11 for retailing.

Facilities for post harvest handling include those at the depot at Young street headquarters (receiving, packing, cool store and retailing) and rented space at River road used for washing, grading, curing of root crops, cool storage and packing. In this latter case the facilites are also used for handling export crops. Assembly and transport is carried out with a fleet of four vehicles: two refrigerated vans and two open trucks.

Produce is purchased from farmers under one of three alternatives: either farmers deliver produce to the Young St. depot; MNIB field officers make pickups at individual farms, or produce is delivered to predetermined assembly points at specified times by farmers where it is collected by MNIB staff.

Domestic sales of fresh produce by MNIB for the years 1984 to 1986 are shown by commodity group in table 4.3.4-1. Total sales in 1986 reached over 1 million lbs. valued at EC$ 723 thousand. While fruits represented 58% of the volume and 30% of the value, vegetables represented 26% of the volume but 53% of the value. These two commmodity groups represented 84% of volume and 83% of value. Root crops represented 10% of volume and 11% fo value, grains and pulses 2% to 3% of volume and value and condiments 2% and 3% respectively. The same.basic percentages held for both 1985 and 1986.

An indication of efficiency of MNIB fresh produce handling is the percentage of losses or spoilage. Spoilage by commodity group for each of the years 1984-1986 is presented in Table 4.3.4-2. As can be seen in 1984 45% of the spoilage was in the root group while in 1986 59% was in the fruit commodity group. In 1985 and 1986 88% and 93% respectively of the losses occurred in fruits and vegetables. This is, it seems, in direct relationship with the volumes handled.

Spoilage as a percentage of sales reached 12% in 1984, 11% in 1985 and 9% in 1986. These figures are relatively low for fresh produce handling and are an indication of a high level of efficiency. However, "spoilage" in this case does not include all losses ocurring within the MNIB system. The data reported by MNIB as "spoilage" do not include losses due to dehydration nor do they include the lower value of produce sold due to a change in quality. These types of losses have not been calculated but an educated guess would place them at, or above, 10% of the value of sales.

4.3.5 Farmers Organizations

None of the four commodity associations (societies) engage in domestic marketing of their produce. Of the remaining six registered farmers groups in Grenada, only two include "marketing" among the objectives for which they were formed. A brief summary of their marketing experience follows.

United Workers Cooperative Agricultural Production Society Ltd. is a group of five young men who cooperatively farm and market cash crops on 33 acres of land The three main crops are bananas, coconuts and tomatoes. The former is marketed through GBCS, coconuts are sold to hucksters and only tomatoes, and other miscellaneous vegetables, are sold by the co-op to supermarkets, hotels and/or the MNIB. No special marketing strategy is employed and they sell in the same way as an individual farmer.

Concord and New Hampshire Cooperative Marketing and Supply Centres, as the name implies, were established to: supply farm inputs and small equipment to their members; provide centres to facilitate extension and centralize the collection, storage and marketing of their members' production. Similar physical facilites are located at two sites (Concord and New Hampshire) 9 miles apart. The closest to St. George's is New Hampshire, 8 miles away. Each centre contains an office, a small chilled room (with air conditioner intended for storage of fresh vegetables and seeds), storage space for farm inputs, retail and storage area, service area with refrigerator and a large space for meetings and/or temporary storage. In addition, the project has one 2.5 ton truck.

Financing and technical assistance for the construction and initial operation of these two centres was provided as a joint effort between ART, EEC/EDF, French Technical Mission, CERES and HIVOS. Short term technical assistance has been provided by CARDATS, IICA, FAO, MOA and through the Agricultural Rehabilitation and Crop Diversification Project (ARCDP).

The Centers got off to a bad start as they were constructed before viable farmers organizations were formed. Consequently, it has proven impossible to meet the intended objectives. The principal problems are summarized below:

Management:

- Groups have not been legally registered and have no constitution;
- inactive membership;
- work burden falls on executive committees at each centre;
- personnel problems with manager;
- lack of control on inventories and poor administration.

Input supply:

- Volumes handled are very small, profits are insufficient to finance costs of operation;
- average monthly sales are too small (EC$ 500);
- too few active farmers using service, and
- no opportunity to bulk purchase.

Marketing of fresh produce:

- Volumes handled were too small;
- taking produce to centres added unnecessary handling and increased transport/labour costs while contributing to increased postharvest losses;
- uneconomical to use air conditioner for chill room operation;
- volume handled and market prices did not permit coverage or operational costs;
- volumes too small to justify use of truck, and
- method of cash purchasing while good for the farmers led to losses for the association.

This attempt at marketing, though conceptually interesting, stands little chance of success until management and farmer participation are drastically improved and markets for larger volumes of produce are obtained. Marketing experiences seem to indicate that given the conditions imposed by small markets, small volumes and minimum requirements for marketing infrastructure and equipment, farmers associations cannot compete effectively with the traditional system on the domestic market. In other words, farmers and hucksters have established very direct marketing channels which they utilize rather effectively.

4.3.6 Imports of Food

In 1985 Grenada imported goods valued at EC$187m, of which 26% (EC$49.4m) was food imports. Of these food imports, 31% was meat and meat products and 14% milk and milk products. The respective values of other groups of products or specific commodities of significance, imported in 1985 are presented in Table 4.3.6-1. In respect to potential for import substitutions, few products stand out. Irish potato imports could be reduced over time if consumer habits can be coaxed towards local root crop substitutes. Onions have no local substitutes and are likely to continue in deficit during the off-season as local varieties do not store well.

Imports of fresh fruits are limited to temperate ones (apples, pears etc.) and overall amounts are relatively small. The value of juice imports do not reach EC$300,000 thus it is doubtfull if economies of scale would justify the installation of an agro-processing industry arour

juices. Fruits preserved in a variety of forms (frozen, dried, jams, jellies) represent a total amount of less than EC$227,000. Again it is seen that the demand for this type product is reduced and unlikely to support, at this time, more than small-scale cottage industries, several of which already exist.

In respect to imports of grains and pulses, rice is the major item, reaching a value of nearly EC$2.4 m in 1985 and a similar amount in 1986. Given local consumption habits there is no real substitute for this product. An increase in the local production of blackeye or pigeon peas could impact favourably upon a few farmers and contribute to reducing imports on the order of EC$200 thousand.

The major potential for import substitution seems to be in the area of meat production.

Since 1985 two meat processing firms have been established in Grenada. This should reflect in a reduction of processed meat imports in the 1986 and 1987 statistics.

Of the EC$ 15.5 million of meat imports, 38% (EC$ 5.8 m) is poultry meat imports. During the period 1986-1987 a few new producers of broilers have come on stream or are in the starting stage. This will most likely reduce the levels of imports of poultry meat from 1987 onwards.

Since 1985 several new firms which utilize milk for the production of milk products, particularly ice cream, have come on stream or are still in the developmental stage. As all milk is imported into Grenada, and there are presently no plans for developing local dairy herds, an upward trend in milk and milk products should be anticipated. It should be pointed out, however, that 1985 imports of milk and milk products was significantly below the historical averages.

Of the total value of food imports in 1985 (EC$ 49.4 million) the MNIB accounted for imports on the order of EC$ 8 million, or roughly, 16%. These imports consisted of powdered milk, sugar and rice for which the marketing board is the sole importer.

4.4 Export Marketing

At the present time there are three types of export marketing taking place in Grenada. These are: the marketing of traditional commodities through commodity associations/societies; the traditional regional marketing of fruits, food crops and small animals by the traffickers markets and the experimental shipment of non-traditional crops to extra-regional markets by the MNIB. Grenada presently has no private sector exporters of fresh produce to extra-regional markets.

4.4.1 Traditional Commodity Exports

Of the five traditional commodity exports, cocoa has been, since 1978, the principal generator of foreign exchange (Figure 1). Nutmeg and banana, since 1979, are at similar levels in respect to value of exports. Mace and minor spices ar at much lower levels. Of the EC$ 33 million worth of exports of these five commodities in 1985, cocoa accounted for 36%, nutmeg 26%, banana 26%, mace 11% and spices 1%. (Table 4.4.1-1).

Cocoa was introduced into Grenada in 1715 and reached its highest level of exports in 1972 when over 6 thousand tonnes were exported. Over the 20 year period for which data is available, exports have fluctuated between 3812 tonnes, in 1987 and 6738 tonnes in 1969. Grenada cocoa beans are considered of high quality and are used for adding flavour, thus receiving favourable price differentials on the world markets. Value of exports has increased steadily until 1979 and decreased ever since (Table 4.4.1-2).

Since 1964, GCA has been the sole exporter of cocoa beans. It provides an input supply service to members and operates a pest and disease control programme. The GCA buys wet and dried cocoa beans from growers and dealers and transports purchases to fermentaries. After fermentation and removal of pulp the beans are dried, polished, graded, bagged and stored until shipment. The GCA controls quality prior to shipment and makes all shipping arrangements. Over half the dry cocoa purchases in the island are channeled through two large local agents.

Problems encountered by the Association are related to the dependency upon the highly fluctuating nature of international market forces. Its saving grace is the high quality of its beans.

Large fixed deposits to cushion yearly changes in farmers' incomes limits the Association's investments ability. Economies of scale in transforming low quality beans into cocoa butter has hindered development of alternative markets. The lack of foresight and short-term projection of price has resulted in low efficiency in the use of GCA resources.

World production of nutmeg is controlled by Indonesia and Grenada. Commercial cultivation began in Grenada in the mid-1800's as a result of severe reduction in Indonesia's production. Of the world production of 8 thousand tonnes of nutmeg and 1 thousand tonnes of mace in 1985 Grenada produced 37% of the former and 20% of the latter. The bulk of the balance is produced by Indonesia. By 1976 Grenada's production returned to the pre-hurricane Janet (1955) level. (Table 4.4.1-3) Exports have been haphazard as shown in

Table 4.4.1-4.

The GCNA was established in 1947. Its functions until recently were limited to grading, processing, packaging and marketing of mature nutmegs and mace. In 1986-87 it began supplying its members with fertilizers.

Like cocoa the nutmeg industry is greatly affected by the market forces although less so since it produces a third of the world demand. The principal factors determining world prices are:

- disease problems in Indonesia and Grenada
- natural disasters (hurricanes/ typhoons)
- substitute products, and
- level of collusion on price fixing between Indonesia and Grenada

As a result of hurricane Janet in Grenada in 1955, the world supply dropped, prices increased and substitute products were introduced to the market place. In recent years Indonesia's production has been increasing and their farmers are begining to improve their level of organization. These things tend to disfavour Grenada's bargaining position. In 1987, Grenada and Indonesia were able to reach an agreement to establish quotas and fix prices at a relatively high level. This has increased income to Grenada's nutmeg growers but is recognised as a temporary situation.

The marketing strategy of GCNA has concentrated in three areas:

- negotiation of a quota arrangement with Indonesia to stabilize international prices;
- search for other markets and uses for nutmeg/mace; and
- diversification of the product line by distillation of non-marketable nutmeg.

The principal problem in the marketing of nutmeg/mace seems to lie in the lack of constant and reliable information as to the international market conditions and marketing expertise to interpret said conditions.

Although bananas were exported from Grenada as early as 1929 it was only after hurricane Janet in 1985 when bananas were required as a shade crop in the rehabilitation efforts, that it became an important income earner. Production reached its peak of 59.9 million lbs in 1968 and has been steadily declining over the past 10 years. Volume exported dropped to 11.6 million lbs in 1986 although value showed a slight increase. (Table 4.4.1-5)

The GBCS was formed in 1954 and has as its principal goal to market all bananas at a good price and to cushion the local

effect of price fluctuations. The society purchases, processes and temporarily stores bananas for shipment. It provides farm inputs to members as well as extension and training services, pest and disease control and regular radio programmes.

In 1986 more than 75% of total exports were packed in the field in an attempt to improve quality. Close association with WINBAN enables the society to tap its research and development programmes.

Currently, Geest accepts all banana fruit which meets its requirements, therefore, marketing problems derive mainly from production problems, e.g. peak production is during the winter months when market is lowest; disease problems such as leaf spot and Moko affect volume and quality; competition for land with other tree crops and other uses decreases volume of production, and the lack of specialization of farmers in the industry result in low yields and poor quality of fruits.

In respect to the future of banana marketing the main question is what will happen to the protected banana market of the UK in 1992 when that country joins the European Community's policies. This, most likely, will open the market to other countries, thus increasing competition.

A series of difficulties in marketing cloves and other minor spices led to the formation of the Minor Spices Co-operative Marketing Society Ltd. in 1971. In 1980 the MSCMS became the sole exporter of all spices (except for nutmegs and mace) including cinnamon, cloves, clove stems, pimento, tumeric, and tonka beans. The Society purchases, grades and stores approved products at its headquarters in St. George's. Upon sale the supplier to the Society receives an advance of about 70% of the total purchase price. Income from sales is used to meet expenses and purchases from farmers. Any surplus is placed in a special reserve fund for eventual distribution to members to stabilize prices. Spices are purchased on behalf of MSCMS by the Nutmeg Association. In this way the former is able to minimize its investments in infrastructure and overhead costs.

Volume and value of exports by the Society reached their peak in 1983 with 49 metric tonnes valued at EC$ 837 thousand.(Table 4.4.1-6). These values declined thereafter. Stocks have been accumulating and marketing drives to reduce stocks have been unsuccessful. The Society is attempting to cope with this problem by identifying alternative makets and evaluating the establishment of a grinding and packaging operation locally. Paradoxically, foreign buyers have expressed interest in buying larger volumes of certain spices than the Society can supply. As world market prices decline, farmers are reluctant to expand production. With the wide variety of products marketed and

the small volumes handled, MSCMS is in greater need of market research than the other commodity organizations but with much less economic and technical capacity.

4.4.2 Trafficker Trade

In respect to the traffickers trade from Grenada, there has been considerable growth in the past decade, particularly since 1982 when total exports to Trinidad were in the order of 1500 tonnes. As shown in Table 4.4.2-1, exports to Trinidad in 1985, reached 5.4 thousand tonnes, valued at approximately EC$ 10 million. In 1986 there was a slight drop to 4.8 tonnes. Nearly all of the exports by traffickers go to the Trinidad market and of these, over 95% are fruits, the balance being root crops and vegetables, mainly pumpkin.

According to statistics of the Inland Revenue Department, there are currently some 673 hucksters/traffickers based in Grenada. They operate independently, without any significant organizational structure.

Traffickers move their produce to Trinidad via three schooners sailing weekly out of St. George's and four schooners making weekly trips from Grenville. Other miscellaneous vessels also carry produce on an irregular basis.

The traffickers have developed their own effective information system, through direct and weekly contacts with both, buyers (Trinidad) and sellers (Grenada).

Close personal relationships have been built up between the huckster and the farmer over time. The farmer often sells his/hers fruits on credit until the next trip (one to two weeks) and the trafficker may buy consumer goods in Trinidad for the farmer.

The fact that traffickers often do the harvesting themselves, with trained crews, indicates their awareness of the need for carefull handling during harvest. However, a series of postharvest constraints including poor roads, rough handling, improper containers, standing in open sun, overfilling of crates, wetting and excessive heat during schooner transport, delays during off-loading and marketing, among others, contribute to high levels of food losses in Trinidad. Since a chain is only as strong as its weakest link, solutions must be put in place throughout the whole system, including the farm, during inland transportation, at the wharfs in Grenada, during schooner transport and at the wharf in Trinidad.

A recent effort to improve wharfside packing space has had little impact as the, 2m x 4m metal roofed structure serves little purpose other than as a serving area of food and beverages.

An added characteristic of this marketing system is that it operates two ways, traffickers returning from Trinidad with food and dry goods often make their profits on the return end of the business.

4.4.3 Non-traditional Exports

Excluding the traffickers and the commodity associations the only exporter from Grenada is the MNIB. The Marketing Board has been experimenting with extra regional shipments of non-traditional exports since 1979. In 1986 MNIB started with trial shipments of mangoes, bread fruit and cut flowers with technical assistance provided under the Agricultural Rehabilitation and Crop Diversification Project (ARCDP). As shown in Table 4.4.3-1 volume of exports through MNIB reached their peak in 1982 with 45.7 tonnes shipped while the value of shipments was highest in 1983, EC$ 49 thousand. As a result of cut flower exports which were initiated late in 1987, it is expected that for this year, total value of exports will be in the order of EC$ 60 thousand plus.

Of the approximately 70 staff persons at the MNIB, only three deal directly with the export operations on a full-time basis. Personnel from the MOA and consultants from the ARCDP support the export programme when required.

The principal constraints of these export efforts are a result of deficient management within the MNIB, lack of flexibility of staff working hours, low morale among staff, difficulty in obtaining supplies of produce and packaging materials, inadequate space and facilities.

4.5 Constraints

- Non existence of an effective mechanism for the coordination of production with marketing (MNIB, MOA and farmers).

- Lack of reliable information on farmers plantings and projected production and dates of harvest.

- Information on markets, prices, results of previous shipments, etc. are not readily available to farmers.

- Farmers tend to minimize their production costs thereby affecting the quality of the produce.

- Volumes of inputs used by individual farmers are small thus complicating the distribution process.

- Certain inputs are not available on the local market.

- Production is scattered and commercial plantings are few or non-existent thus collection of significant volumes is a slow and costly operation.

- Farmers are reluctant to grow produce for lack of a market.

- Small farmers cannot afford to purchase all the tools and equipment necessary for efficient production.

- Height of fruit trees.

- Bruising of fruit caused by careless harvesters.

- Unavailable skilled labour.

- Lack of farmer participation and/or concern in the harvesting process.

- Volumes of fruit of exportable quality are low in some cases, e.g. mangoes, breadfruit and plantain, and very low in others, e.g. sweet potatoes, flowers, etc..

- Farmers harvest prior to maturity.

- Farmers mix varieties of produce.

- Excessive handling of fruit and vegetables between farm and market contribute to postharvest losses.

- Insufficient or inadequate field containers contribute to unnecessary bruising of produce.

- Poor perception at the level of MNIB, MOA and farmers of the importance of good postharvest handling practices.

- Short shelflife of certain fruits such as breadfruit.

- Wide variety of mango cultivars with diverse postharvest characteristics.

- Postharvest characteristics of flowers and foliage are relatively unknown.

- Packing and cooling facilities for the expansion of exports of non-traditional fresh produce and flowers are inadequate. Different types of produce are maintained in the same cool room.

- Small volumes of produce at the farm level create delays in the collection of quantities sufficient to obtain economies in air or sea shipments.

- Unavailability of chemicals to extend the shelflife of fruits, flowers and food crops.

- Farmers and traffickers are accustomed to the standards used at the national and regional level but not of the

higher standards necessary for the European and North American markets.

- The trafficker form of marketing consists of a highly integrated system which flows in two directions, i.e. farm produce to Trinidad and transformed goods back to Grenada. To have any significant impact upon the improvement of this system will require comprehensive actions from farm in Grenada to market in Trinidad.

- Information on farmers crop and production is not available thus it is difficult to programme shipments and/or meet the commitments once programmed.

- Information on market prices and changing conditions in the international markets arrive late to Grenada or not at all.

- Air transportation is a serious constraint and requires very good, fast and flexible management decision making.

- Exporters from Grenada have no effective way of monitoring buyers in UK, USA and Canada.

- Insufficent information is available on the postharvest characteristics of many cultivars.

- Prices on the international market are often too low to stimulate interest of the farmers.

- Grenada produce is relatively unknown in European and North American markets.

- MNIB was originally created to improve the distribution of agricultural commodities in Grenada. It has grown over time and taken on new functions but does not have clearly defined goals or strategy. The lack of direction negatively affects staff motivation.

- Purchases are made at the farm level. This method is slow, expensive and often does not generate large volumes of produce.

- MNIB staff, like other public sector employees, have fixed work schedules which do not permit the flexibility required in the fresh produce trade.

- MNIB, with heavy investments in infrastructure, equipment and personnel cannot compete effectively with farmers and traffickers who have no or minimum investments in marketing infrastructure and who tend to value their labour below the market cost.

- Buyers (hotels/restaurants/supermarkets) view MNIB as a

market of last resort. They go there or to the public market only when the farmer does not deliver directly.

- MNIB is not equipped to offer the necessary facilitating services such as market intelligence, training, technical assistance or other. To do so would require restructuring and upgrading of staff.

- MNIB facilities are inadequate to carry out large scale exportations of fresh produce and flowers.

- Seasonal overstocks of certain items lead to excessive food losses - a sign of poor planning and weak marketing functions.

- MNIB does not have the capacity to respond to specific requests by foreign markets.

- Excluding the commodity associations, farmers organizations in Grenada are few in number and those which do exist are extremely weak in terms of management capability and services offered to members. Many of the constraints mentioned above will impact upon farmers organizations attempting to organize and carry out marketing activities.

4.6 Agro-industry

The agro-industrial subsector does not represent a vibrant market for locally grown agricultural produce and animal products. In the case of fresh agricultural produce there are a number of small home and cottage industries which purchase small amounts of a wide variety of fruits and spices. In 1985 total purchases of the largest 12 agro-industries in Grenada reached approximately 35 tonnes and have increased only slightly through 1987. Over 50% of total purchases made were for processing of spices.

Given Grenada's comparative advantage in the production of a wide variety of spices it is only natural that local agro-processing industries have evolved producing condiments.

Approximately 10 such industries exist. Most are quite small, grinding and packaging for the local market, however a few are large enough to produce significant volumes of quality produce for the export market.

The MOA once owned and operated a small spice grinding plant which was then passed to the Minor Spices Co-operative Marketing Society in the seventies and is used by the society for grinding spices for sale in the local markets.

In addition to those firms producing condiments there are a

few small scale industries which produce herbal teas and perfumes. A small number of home industries and at least one industrial size operation processes cocoa in a rudimentary form for domestic sales.
Meat products, including ham, bacon, sausage and miscellaneous others, are produced by two meat processing firms with capital investments on the order of EC$ 200 thousand or less. Both these operations are small but still rely heavily on imports of meats from abroad. Products are of high quality and are expected to significantly reduce imports of retail cuts of meat.

Several local firms produce ice-cream, reconstituted milk and some other dairy products. All raw material used, however, is imported.

The MOA, through the Produce Chemist Laboratory, manages a small processing plant with the capacity to hull, roast, grind and package coffee. Due to the smallness of the local market and the lack of raw material it only operates periodically. Most coffee beans are imported from Trinidad.

With respect to processing of other agricultural products there are some 12 small industries, of which 8 are home industries and 4 are cottage industries.

Recently a new agroindustry utilizing fruits has been opened, with an eye on overseas markets. It produces what is called "Grenada's wine cooler", a low alcoholic fuit based drink. At this point in time it is not possible to evaluate the potential demand for fruits that this industry might develop.

4.6.1 Main constraints

The principal constraints to the development of the agro-processing sub-sector in Grenada are the following:

a. The small domestic market and potential demand prevent developing bigger industries and take advantage of economies of scale.

b. Most small scale operators are unable to meet bank requirements for the securement of loans.

c. Frequent interruption of basic services such as electricity and telephone.

d. Seasonal operation of the plants due to seasonality of supply and lack of adequate storage facilities.

e. Available fruit cultivars do not necessarily meet the required standards for agro-processing.

f. Obsolete equipment contributes to high production costs.

g. High costs of packaging material that has to be imported in most of the cases.

V. POLICY AND PROJECT IDENTIFICATION

5.1 Development potential.

Grenada, in spite of its small size, in terms of territory and in terms of markets still has development potential of its agricultural sector.

There are more than 20 thousand acres of idle agricultural land that can be put into use to increase production almost immediately.

There are a number of well qualified people in different positions of Government and in the private sector, many young people who, with the right incentives, can be trained in the areas of need.

Financial resources for development purposes do not seem to be a major constraint in the short run. On the contrary, there appears to be a significant amount of resources available to Grenada. What is required is the identification and preparation of sound projects, and the coordination of actions of the different Agencies operating within the region.

Grenada has, as do the other islands in the Windwards, a cadre of bi-lateral, multilateral, regional and international organizations operating. They are an important source of financial and technical resources if properly managed.

On the economic side, a policy oriented towards export promotion and import substitution has been adopted. It is then necessary to determine the degree of competitiveness of Grenada. To do so, a thorough study on financial costs of production and the capacity of each potential crop to generate/save foreign exchange for each dollar invested, would be required. Since necessary information is scant it was decided to estimate, albeit grossly, an "index of competitiveness" for fruits from the information put together by IICA/CDB in the Fruit production/marketing study.

The method followed was to gather prices of the main inputs and investments for the development of crops such as land, labour, pesticides, fungicides and fertilizers for each of the Windward islands, and compare them with the respective costs in the Dominican Republic (a "low cost" country), Barbados ("medium cost" country) and Florida, USA, which represents and area that can produce the same products and at the same time is a potential market for Caribbean fresh produce.

The latter was the base for comparison and each price was thus expressed as a proportion of the Florida price. The

information with the values for the indices is presented in Table 5.1-1.

In order to have an approximation to the degree of competitiveness, two synthetic indexes were estimated. One which included all items (only Grenada and Barbados had information for all of them). The other index considered only those items for which information was available for all countries.

If we assume an equal weight for each cost component (indeed quite a gross assumption), then it can be seen that the Dominican Republic, St. Lucia and St. Vincent, in that order, have a certain degree of competitiveness. Their indices being 80, 98 and 102, respectively. Grenada's is 11.5% above the average for Florida.

The comparison among the West Indian countries reconfirms that Barbados has much higher costs of production than the Windwards, while St. Lucia has the lowest among the latter group. Grenada is in the middle of the group, while Dominica presents the highest index of the Windwards.

5.2 Summary of main constraints.

In each of the previous sections a detailed discussion of the constraints and problems facing each subsector was done. In this section a summary of the most important ones is presented in order to help identify the recommendations for action.

Figure 2 presents these problems in a hierarchical arrangement, depicting a cause-effect relationship. The diagramme should be read from bottom to top. In essence, the problem of low agricultural output in Grenada cannot be solved if, first the problems under it are not solved (i.e. input suppply, put agricultural land back to work, agricultural labour supply, etc.) In its turn, these cannot be solved if the problem under them are not solved.

a. Smallness of the internal market precludes the commercial supply of inputs adequate to the different types of production other than the traditional export crops.

b. Relatively high acreage of agricultural land not being utilized. Apparently because of low returns to agriculture, land with potential for production is being left idle or is being devoted to non-agricultural use.

c. Low net income of farmers. In a study carried out by CARDI in 1981/82 it was found that, on average, small farmers' net return for a year was even less than that of an agricultural labourer.

d. Low agricultural labour income relative to other sectors of the economy. According to information from the population census, the average earnings of an agricultural labourer is half of the average earning of a labourer working in other sectors of the economy.

e. Because of the above, and due to the seasonality of demand for labour in the Agricultural sector, there is a shortage of supply of labour in spite of the high unemployment rates.

f. High age of the agricultural population. It is said that older farmers are less willing to undertake risk, utilize credit or introduce technological innovations. All these characteristics tend to retard the development of the sub-sector.

g. Small size and fragmentation of holdings, along with the ruggedness of the terrain. This aspect is preventing the introduction of technology and makes it very difficult to deliver services and inputs.

h. There is low institutional capability for generating and disseminating information for decision making. This is lacking at all levels of the agricultural sector, from the Ministry of Agriculture to specific projects, to the Marketing Board, farmers organizations and at the farm level.

i. Production losses due to poor management of pest and disease problems, as well as poor post-harvest handling of fruits and other perishable commodities.

j. Lack of coordination and delivery of extension services.

k. Poor infrastructure, referring mainly to road and export marketing infrastructure.

l. Little knowledge on adequate animal husbandry practices.

m. Insufficient extension services specifically addressing livestock production.

n. Small sizes of holdings for livestock production.

o. Praedial larceny.

5.3 Goals

In the definition of the specific goals for the Agricultural sector it is important to bear in mind the main developmental goals for the economy as a whole - the generation of foreign exchange and the creation of

employment - and the overall goal for the sector, to revitalize and diversify production.

In this context the following specific objectives can be defined for the sector:

a. Increase the acreage under agricultural use.
b. Optimize the use of agricultural land.
c. Raise the managerial and technological capability of the farmer.
d. Increase the production and productivity of main crops and livestock subsectors.
e. Create and promote mechanisms for farmers participation in the development process.
f. Improve the efficiency of the agricultural marketing system.
g. Facilitate the use of credit by farmers.
h. Promote consumption of locally grown food-stuffs.
i. Promote linkages between the agricultural sector and the tourist sector.
j. Facilitate access to land to new farmers.

In terms of products which should be given priority attention the following are recommended 1/:

a. Food crops and vegetables: sweet potato, yam, pumpkin, tannia, dasheen, tomato, carrots, eggplant, and cassava.

b. Fruits: mango, breadfruit, soursop, papaya, orange.

c. Flowers: Ginger lily, croton, heliconia, foliage.

d. Livestock: sheep, goat, cattle, pigs.

In order to define targets it will be necessary to develop specific studies by commodity, or group of commodities. That should come as a second stage of the current exercise, that is during project preparation.

5.4 Recommendations

The following represent specific actions and projects that have been selected as important for implemention in the short run to overcome the principal constraints identified.

1/ In this document traditional crops such as Cocoa, Nutmeg, Coffee, bananas and minor spices are not dealt with. Their priority refers to re-vitalization.

5.4.1 Institutional

The Ministry of Agriculture, as the leader of the Agricultural Sector has the responsibility for policy definition and for coordinating the actions of the various agencies -public and private- in policy implementation. To fulfill this role it must have in place a capable cadre of technicians with access to an adequate quantity of resources.

5.4.1.1. Policy and planning

a. The Ministry should play a more active role in the coordination of activities of donor and technical cooperation agencies that operate in the country with the purpose of avoiding duplication and increasing effectiveness in the use of human and financial resources. In this respect, one of the main aspects is to assure that whatever activity or funding coming into the country is in line with the country's goals and objectives and, more important, in line with the special characteristics and needs of Grenada.

b. Develop within the MOA the institutional capacity to manage information systems and carry on advisory services to decision making in the agricultural sector.

c. The MoA will develop a continuous exercise of prioritization of agricultural production based on:

- markets
- ecology
- costs of production and returns
- foreign exchange generation/savings

d. The MoA will adopt a systems approach for the analysis and development of specific commodity programmes and/or projects in order to ensure the integration of production with postharvest handling capabilities and market potential.

Market demand must be the guiding light in developing projects and programmes for export of agricultural produce. However, the potential for penetrating and maintaining market share depends on many factors, including: quality of planting materials, cultural practices of farmers, harvesting techniques, postharvest handling, available transportation and others. Failure to consider one or more of these aspects will eventually lead to failure in marketing due to insufficient supply, poor quality or high costs.

e. The MOA should carefully analyse the problems of low incomes, low productivity and underemployment in the small farm sub-sector, with a view to improving the well being of farmers and therefore their participation in, and positive contribution to, the development process.

Ultimately, as discussed in section 2.3, the problems of low incomes and scarcity of employment opportunities in rural Grenada have to be tackled before any significant growth can be stimulated and maintained in the Agricultural Sector. While this constraint has been several times identified as a "core constraint", very little is known with accuracy about the income of the small farmer in Grenada or about the components of that income, whether positive or negative. A detailed investigation of this problem is the logical begining to any attempt at solutions.

f. It is no secret that a sound and solid development of Grenada requires integration with other windward or OECS countries in order to achieve economies of scale in diverse matters such as markets for inputs, markets for domestic production, development of export markets, among others. It is therefore essential that a conscious effort be made towards this end in areas which are amenable to a regional approach.

For this purpose, it is proposed that within the realm of the OECS Secretariat a permanent body composed of Permanent Secretaries and CAOs of the ministries of agriculture be created. The main purpose being to manage this sub-regional system and identify the areas which will be more advantageous to undertake a subregional approach.

5.4.1.2 Research and technology transfer

a. In collaboration with CARDI, the MoA will rationalize, strengthen and design the applied research and technology transfer programme in accordance with agreed production priorities and taking into consideration the whole food system.

b. The extension services should be reorganized and strengthened in accordance with agreed priority production lines.

5.4.1.3 Agricultural support services

a. Promotion of activities to encourage integration of the common services of the commodity boards and the eventual creation of a single corporate body .

The Commodity Boards: Cocoa, Nutmeg and Minor Spices are relics of the plantation system. They have not appreciably adapted to the harsh competitive realities of modern commodity markets. Moreover in the special circumstances of Grenadian Agriculture, these boards, and the Banana Association, are dealing, each of them, with the same 6-7000 farmers, duplicating and/or overlapping services and facilities. There are already encouraging initiatives being taken by these organizations to share facilities. These initiatives should be encouraged and expanded into areas such as

-pest and disease control
-general farm management advice
-statistical and information services
-soil conservation
-bulk purchase and distribution of fertilizers and other agricultural chemicals
-coordinated storage, marketing and transport
-accounting

b. Government will support a series of actions aimed at strengthening organizations of farmers developing agricultural enterprises oriented towards import substitution and/or export development. These actions are the following:

- Exchange of experiences and expertise within the region to promote and assist the formation and development of Grenada's farmers.

-The formation of a special unit withing MOA to provide the required organizational support and training in management, information systems, postharvest handling and marketing (in close coordination with the export marketing agency).

- Formation of equipment pools for rental to members of farmers organizations.

- Facilitate the supply of, and access to, agricultural inputs required for production.

- Assist in the development of effective market intelligence systems.

- Assist in the formulation and evaluation of production/marketing projects for selected export commodities.

c. The import and domestic distribution of fresh produce functions will be separated from the hands-on export operations of the MNIB.

If the existing MNIB continues to import selected basic food items, generated profits will be used to promote local food distribution through the Young St. depot. It will also provide facilitating services such as market information, training and packaging materials, among others, to the newly developed subsector of exporters of non-traditional commodities, e.g. flowers, fruits and root crops. Should the MNIB execute the ARCDP plans for construction of packing house and cooling facilities, said facilities would be rented to and operated by associations of exporters.

d. Utilize CATCO services in the development of non-traditional exports.

The Caribbean Agricultural Trading Company Ltd. (CATCO) has six years of experience in trading Eastern Caribbean fresh produce in the UK market, and more recently the USA and Canada. Total sales in 1986/87 were 527 tonnes and included fruits, vegetables, root crops, and flowers. Value of sales exceeded US$ 600 thousand. During the six years of operations CATCO has developed important expertise in terms of organization, market information, organization of production, transportation, demand, supply, standards and many more. It is now in a position to assist new attempts at exportation and this opportunity should not be missed.

e. Reorganize the agricultural window of the GDB to improve small farmers access to credit.

GDB needs to take a more active role in defining the local credit policy for the agricultural sector and in promoting the use of credit by famers. In seeking external finance GDB has had to adjust to lending criteria not always in accordance with Grenada's small farmers idiosyncracy and economic characteristics. Lending conditions such as collateral demanded, number of times that a farmer has to go to the Bank to get his/her money, etc. are some of the aspects needed

to be reviewed under the light of experience. This should go along with a well designed promotional and educational campaign in order to effectively extend the portfolio to the small farm sector.

f. Since improved livestock production calls for closer attention of farmers on all aspects of the production cycle, the role of the animal health assistants will be widened to cover production aspects.

g. Advance and support the creation of a subregional input purchasing mechanism in order to lower the costs of inputs for crops other than the traditional export crops.

h. Strengthen the plant protection calls for closer attention of farmers on all aspects of the production cycle. The role of the animal health assistants will be widened to cover production aspects.

5.4.1.4 Statutory measures

a. Stimulate and support agro-industrial enterprises such as meat and fruit processing by a combination of extraregional import controls and provision of a special credit line.

In a first stage support should be provided to local processors of meats since, according to the import statistics available, Grenada already has an important internal market that could be supplied, at least in part, through local production. In terms of fruit processing, this does not seem to be the case, therefore any action in this direction should wait until the tourist inflow and its derived demand increases sufficiently to justify it.

b. Encourage productive use of land and reverse the trend of increasing idle lands through:

-A tax system based on the potential productivity of land, thus penalizing low productivity and idle land.

-zoning of land so as to designate areas in which real state development may be allowed.

-establish a special line of credit in order to finance land purchases to those interested in farming.

5.4.2 Commodity programmes

5.4.2.1 Food crops and vegetables

a. Increase and decentralize the production and distribution of high quality food crop and vegetable planting materials.

b. Continue the process of introduction and screening of new varieties and cultivars.

5.4.2.2 Fruit crops

a. Strengthen the operation and management of the central propagation unit and establish satellite nurseries for distribution of fruit tree plants.

The construction of satellite nurseries will improve the distribution sytem of fruit trees, thus allowing the farmer to have easier access to them. They will be set in areas with high potential for fruit production but are afar from the central nursery. Plants will be propagated at the Mirabeau nursery and brought to these satellite nurseries when they are ready to be released or at their final stage of growth.

Efficiency at the nursery will be improved by training nursery personnel in management practices and by enforcing standards to guarantee quality of plants produced. A citrus virus indexing programme will be the starting point towards the production of virus free planting material.

b. Advance and support the creation of a multinational germplasm bank of fruit species for the Eastern Caribbean.

The creation of a common Germplasm Bank should, over the long term, lower the cost of supplying high quality planting material to the member countries since it will eliminate the need for maintaining museums in each of the countries. It will also minimize the risks of introducing new pests and diseases and their dissemination to farms. The Bank should act as a post-entry quarantine center.

5.4.3 Projects

a. **Strengthening production/marketing capabilities of small farmers organizations.**

This project would aim at strengthening farmers

organizations capabilities on business management, development of information systems and promotion of new organizations. The Project will use the Farm Model Settlement scheme to reach the farmers and at this level will improve infrastructure, management skills and information system. A line of credit will be opened and special marketing services made available.

b. **Irrigation of fruits, food crops and vegetables in the dry areas of the island.**

Project components are:

i. Determining priority areas

ii. Determine sources of water for selected areas

iii. Develop specific irrigation projects

c. **Rehabilitation of fruit tree resources.**

It will have three main components:

i. **Topworking of mango and avocado seedlings.** In Grenada there are large quantities of mango and to a lesser extent, avocado seedlings with little or no commercial value. These plants can be topworked with cultivars in high demand for the extraregional market, e.g. USA, and develop commercial production in a relatively short period of time.

ii. **Rehabilitation and re-planting of breadfruit.** One of the most important constraints to harvesting of breadfruits is the height of the trees. A technically conducted programme of rehabilitation of these, will not only reduce the height of the trees, hence facilitating harvesting, but also will rejuvenate old trees, thus boosting their production in the short run.

iii. **Rehabilitation of other commercial fruit tree crops.**

d. Through a series of **pilot projects, the economic feasibility of production of exotic, or neglected, fruit crops in Grenada,** will be determined. These projects will include introduction, testing of performance in pre-established regions and the validation of technological packages for their economic production. In a second phase they will be submitted to market tests in the fresh and processed product markets. Some of the fruits with

potential are:

- Macadamia nut
- Papaya
- Soursop
- Passion Fruit
- Carambola
- ASEAN fruits (mangosteens, langsat, rambutan)

In addition to these early and late cultivars will be tested in order to extend the productive season of selected species.

e. Construction of handling and storage facilities for export crops.

Based on the experiences of MNIB/ARCDP, Grenada is now on the threshold of initiating an organized export programme of non-traditional export commodities. One of the principal bottlenecks is the lack of adequate facilities for packing and pre-cooling perishable produce. The funds for the construction of these facilities are available within the ARCDP project and earmarked for MNIB. The construction of these facilities should be initiated as sooon as possible and, although owned by MNIB (or its replacement), the facilities should be rented to associations of farmers at a subsidized price until said organizations reach a profit making level. The export marketing entity will provide facilitating services such as market information, supply of packing materials, organization of training and other services demanded by exporters.

f. Establishment of a pilot project to determine the economic viability of ruminant production within the Model Farm Scheme.

g. Support to increase production of existing livestock systems, including:

- feeding
- improve animal stock
- training and demonstration
- improved extension and support services
- production and health information systems
- improved delivery of support services
- animal health and production information and data management systems
- improved delivering of support services

h. **Reorganization of the Carriacou Sheep Project.**

The island has a tremendous potential for sheep development and the project, as it is today is not fullfilling its goals. It is therefore suggested that a group of farmers be selected and flocks of 10 to 15 animals be distributed among them, along with 10 acres of land. This will substitute the two farms that are currently run by the government.

i. **Development of communal grazing pastures for landless famers in Carriacou.**

5.5 Proposed calendar for implementation and institutional responsibilities.

Figure 3 presents the proposed time schedule for implementing recommendations. It should be noted that the dotted lines in the implementation schedule means that it is an on-going activity after the project has finished.

This time schedule should serve as the basis for monitoring the implementation of the plan.

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