

# IICA



***FRUIT PRODUCTION  
AND POST HARVEST HANDLING  
PROJECT***



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AND POST HARVEST HANDLING  
PROJECT***

***Prepared by:  
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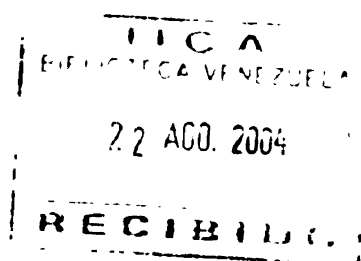
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**Bernard Francois**  
Project Specialist



# **1 PROJECT SUMMARY**

## **1.1 Problems to be addressed by the project**

This project is designed to address the major factors constraining the development of the fruit sub-sector in Grenada. They include the unavailability of adequate planting materials; the fact that fruits in Grenada are produced from trees scattered among a large number of farms over great distances (often only a few trees per farm); the low level of technology usage in fruit production; the absence of a credit regime particularly suited for establishment of fruit orchards; the fact that technical information related to the various aspects of fruit production are not readily available to potential producers; the fact that farm production inputs are not usually available on time, in sufficient quantities or that the required formulations are not always available; and the inadequate facilities and rudimentary techniques employed in product harvesting, handling and transport which leads to poor quality of the produce and high post harvest losses by the time it reaches the market.

## **1.2 Project objectives**

The **overall objective** of the project therefore, is to increase fruit production and productivity and thus contribute to Grenada's agriculture diversification efforts while at the same time contributing to the objectives for the overall sector, viz. to increase the competitiveness of the sector, to increase the overall standard of living of farmers, to increase employment opportunities and foreign exchange earning capabilities. The **project's specific objectives** are:

- to improve the institutional support services including plant propagation to facilitate the development of the fruit sub-sector;
- to increase the capabilities of the MNIB and private exporters in carrying out their marketing functions;
- to increase the acreage and volume of fruits produced and farm productivity;  
and
- to improve the quality of fruits produced and marketed.

## **1.3 Project results**

At the completion of the project, the following results are expected:

- an expansion of the plant propagation facilities at Mirabeau and increased capabilities to supply the required planting material;

- the packing facilities at the MNIB and PFU upgraded;
- the capabilities of the Ministry of Agriculture to implement agricultural investment projects improved;
- increased capabilities of farmers to produce fruits;
- 625 acres of fruit trees (440 acres of mango, 95 acres of avocado, 40 acres of soursop, 40 acres of sapodilla, 10 acres of breadfruit) established on 125 farmers holdings and fruit production and export increased;
- increased capabilities of private exporters, the PFU and the Marketing and National Import Board personnel to conduct post harvest operations including the marketing of fruits.

#### **1.4 Project activities**

The project will comprise of a number of activities to alleviate the constraints and achieve the results identified above. These are summarized in Table 1.1. To meet the increased demand for planting material, the project will provide resources for additional physical propagation facilities, a land rover, a bobcat and 8 general propagation workers.

With respect to strengthening of the capabilities of the Marketing and National Import Board (MNIB) and the Productive Farmers Union (PFU), the project will provide resources for upgrading their facilities and the training of personnel there at their packing houses in the use of the equipment and in various aspects of post harvest handling of fruits.

To be able to successfully implement the project, a project implementation team is to be established. This will include the recruitment of a Project Manager, a post harvest specialist, three project officers and a project administrative officer/secretary. Training will be given to the project officers to familiarize them with the technical and methodological aspects of the technologies so they would understand the requirements and be able to effectively transfer them to fruit producers. Moreover, ongoing monitoring and evaluation activities will be an integral part of the implementation process.

One of the critical problems identified as constraining the development of the fruit sub-sector is low production and productivity of fruits. The major activities to be conducted to alleviate this problem will include the establishment of 625 acres of fruit trees (95 acres avocado, 440 acres mango, 40 acres soursop, 40 acres sapodilla and 10 acres breadfruit) on 125 farms categorized into five farm models as illustrated in Table 1.2. During the year of planting and the next year, the orchards will be inter cropped with papaya, hot pepper and sorrel.

**Table 1.1: Summary of project activities to achieve the desired results**

Project results	Required activities	Tasks to be performed
Propagation capabilities expanded	<p>Procure equipment and vehicle</p> <p>Provide additional facilities</p> <p>Hire propagators and field workers</p>	<p>Develop material and equipment plans            identify potential suppliers            contact and review suppliers            select supplier and place order            Concrete plant holding areas            install sprinkler irrigation            construct gravel road            expand soil sterilization area            install second soil sterilization unit            construct storage area            refurbish building for office            Develop recruitment plan            advertise positions            interview and select persons</p>
MNIB & PFU capabilities strengthened	<p>Procure equipment</p> <p>Install equipment</p> <p>Conduct in-service training</p>	<p>Develop material and equipment plans            identify potential suppliers            contact and review suppliers            select suppliers place order            Identify potential contractors            select contractor            issue contract            Identify trainers            design training program            conduct training            evaluate training program</p>
Experienced project implementation team	<p>Hire project implementation team</p> <p>Train field agronomists</p>	<p>Develop recruitment plan            advertise positions            interview and select persons            Identify trainers            develop training materials            conduct training courses            evaluate training</p>
625 acres of fruit trees established	<p>Establish and maintain fruit orchards</p> <p>Establish credit program</p> <p>Train farmers</p> <p>Ensure inputs are available</p>	<p>Advertise promote program            select farmers            provide technical support            supervise distribution of plants            Advertise credit program            process loan application            disburse credit as required            provide technical assistance and monitor                credit use            collect repayment            Select trainers            design training program            conduct training courses            evaluate training courses</p> <p>Liaise with fruit producers            determine input requirement            inform importers of inputs required</p>
Increased post-harvest capability	<p>Train MNIB and private exporters</p> <p>Increase marketing capability</p>	<p>Select trainers            design training program            conduct training courses            evaluate training program            Strengthen linkages with TROPRO            attend trade shows market visits            advertise in fruit journals magazines            establish linkages with importers</p>

**Table 1.2: Farm models and acres of fruit trees to be established**

Farm Models	Size	Number	Avocado	Mango	Soursop	Sapodilla	Breadfruit
	(acres)		acres				
Model 1	1	40	0	1	0	0	0
Model 2	2	30	0	2	0	0	0
Model 3	5	25	1	4	0	0	0
Model 4	10	20	2	6	1	1	0
Model 5	20	10	3	12	2	2	1
<b>TOTAL</b>		125	95	440	40	40	10

An integral part of the fruit production project will be a credit program suitable for fruit tree development. The goal of this program will be to provide credit for the farmers involved in the production of 625 acres of fruits for the establishment of the orchards and working capital for three years after planting. A grace period of five years on the repayment of principal will be given. During that period however, the borrowers will be expected to make interest payments on the principal at a rate of 10 per cent per annum. The loans are to be repaid over six years after the grace period. The program will be designed to take into consideration the phased planting of the orchards. For accounting purposes, funds borrowed for the establishment of orchards in the second year of the project for example, will be treated separately from funds used for the establishment of orchards in the third year. All disbursements would each carry a grace period of five years and repaid over six years.

Short-term credit will also be given for the establishment of papaya, hot-pepper and sorrel as intercrops. However these are to be repaid at the end of one year. A rate of interest of 10 per cent will also apply.

An important activity to be implemented by the project will be training of the farmers to help ensure that they are able to properly adopt the required fruit production technologies. At the training sessions, the requirement of the technologies will be demonstrated and explained. The trained project officers would provide technical assistance to the farmers.

To help ensure that the required farm production inputs are available in the correct formulation, the project management will liaise with importers of inputs after consultations with farmers' organizations and other institutions involved in the project. The importers will be advised annually of the types and estimated quantities of inputs which will be required based on the crop production schedules.

The project will also provide resources for implementing activities for increasing capabilities in post harvest operation. These would include the strengthening of the post-harvest capacity of the Marketing and National Import Board; the improvement of the

capabilities of farmers in areas of pre-harvest, harvesting and post harvest handling of fruits, the provision of training to private exporters in the areas of post harvest handling and marketing and the provision of support for marketing.

## 1.5 Project costs and financing

The total project cost excluding allowances for inflation is estimated at US\$5.74 million (Table 1.3). Of this amount, US\$0.333 million is to be used for upgrading the facilities at the propagation station at Mirabeau and equipment at the Marketing and National Import Board. An estimated US\$3.138 million is to be used for the provision of credit for fruit producers. The implementation of the project will require US\$2.269 million; these resources will be required for project personnel, propagation supplies and supporting services.

**Table 1.3: Cost of the project by category**

Cost category	Constant US\$	%	Current US\$
Capital costs	333,453	5.8	333,453
Credit component	3,137,942	54.7	3,597,955
Operating costs	2,268,603	39.5	2,639,866
<b>Total Project Cost</b>	<b>5,739,998</b>	<b>100.0</b>	<b>6,571,274</b>

It is envisaged that the project will be financed by both external and local resources. External resources will be required for investment, the credit component and the annual implementation of the project during the first six years. This will amount to US\$4.581 million. Thereafter, the implementation will be financed by the local authorities. The amount of local financing required by the project would amount to US\$0.826 million (Table 1.4).

Assuming a rate of inflation of 5 per cent per annum, the total amount of current dollars which will be required for the credit programme would amount to US\$3.598. The total amount of external resources required in current dollars would amount to US\$5.177 million, while local contribution would amount to US\$1.395 million. A more detailed breakdown is presented in Table A3.27 of Annex 3.

## 1.6 Benefits of the project

The financial benefits to be derived from the project in constant dollars would amount to US\$32.234 million. The total amount of resources to be used, including resources for farm production, marketing and loan administration cost is estimated at US\$24.587 million.



**Table 1.4 Project implementation funds flow analysis (Constant US\$)**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Years 10-16
<b>Production credit</b>	391889	679042	470115	534569	436749	304631	218112	102837		
Short term	124012	259147	59767	49230						
Long-term	267877	419894	410348	485339	436749	304631	218112	102837		
Total short term	492156									
Total long term	2645786									
TOTAL	3137942									
Project implementation	516941	232838	195353	186323	176663	134663				
TOTAL	1442778									
Total external resources	908830	911879	665467	720891	613411	439293	218112	102837		
Local contribution*							82478	81428	81428	81428
External resources required	4580720									
Total local contribution	825825									

\*An additional US\$10000 will be required in year 15 for a full project evaluation making the local contribution in that year US\$91428

The net benefit, net present value at 12 per cent and the internal rate of return of the project are estimated at US\$7.652, US\$1.099 and 10 per cent respectively. Additionally however, due to the fact that fruit trees have a productive life beyond the period analyzed, benefits are expected for a much longer period into the future.

The benefits expected to the farmers based on the individual farm models and to the Marketing and National Import Board are presented in Table 1.5. For the farms of 1 acre, a rate of return of 87 per cent may be expected. This is due to the intensity of the intercropping. For the other farm models, the rate of return is expected to range from between 55 per cent and 69 per cent. A relatively high rate of return of around 477 per cent is expected to the MNIB for participation in the project.

**Table 1.5: NPV and rates of return to farms, the MNIB and the overall project**

Farm model	NPV (12%) US\$	IRR %
Model 1	5,456	87
Model 2	7,770	55
Model 3	27,254	69
Model 4	49,302	58
Model 5	111,865	69
Marketing Board	5,572,422	477
Overall project (Economic return)	1,305,269	20

## **1.7 Limitations of the analyses**

A number of limitations can be cited with the analyses. Among the most important is the fact that the study did not investigate the possible development of agro-processing as a result of the volumes of fruits being produced. Such a development would further enhance both the financial and economic analysis of the project. It is envisaged however that as fruit orchards are established and the volume of fruits produced increases, a second phase of the project which will include agro-processing will be developed.

A second limitation is that an in-depth study of the markets for fruits in North America and Europe including demand analyses were not undertaken. The potential for the fruits was based on observations of price and volume trends for the various fruits in the markets. However, the study on agricultural competitiveness by Antoine and Taylor (1993) supports the main crops in the project.

**LOGICAL FRAMEWORK: Grenada Fruit Production Project**

INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS	SOURCES OF VERIFICATION	ASSUMPTIONS
<p><b>OVERALL OBJECTIVE</b> To increase fruit production and marketing capabilities for fruits; increase competitiveness of the agricultural sector</p>	<p>volume of fruits produced and exported; number of persons employed in the sector.</p>	<p>project reports and statistical reports; observations and interviews with fruit producers,</p>	<p>Government support is maintained; Farm-gate price of fruits remains attractive;</p>
<p><b>SPECIFIC OBJECTIVE</b> 1. to increase institutional support services; 2. To increase post harvest capabilities of MNIB, PFU, private exporters and farmers; 3. To increase the acreage and volume of fruits produced; 4. To improve the quality of fruits produced</p>	<p>Number of training courses conducted for project officers, farmers and marketing personnel; per acre yields; established fruit acreage; level of fruit production; number of farmers and fruit exporters trained; ratio of plants supplied to demand; volume of fruits exported by grades.</p>	<p>Administrative records, observations and interviews with project staff members and participating institutions. statistical reports; interviews with fruit producers</p>	<p>continued government support is maintained; there are no natural disasters such as hurricanes during the life of the project; the present trend in market demand for fruits and prices remain; there is no introduction of new pests nor environmental changes to cause non-pest organisms to reach pest status</p>
<p><b>INTERMEDIATE RESULTS</b> 1. Expanded propagation capabilities;  2. Strengthened post harvest capabilities;  3. Fruit orchards established;  4. Increased capacity in fruit production</p>	<p>8 additional propagation staff recruited; 250,000 plants distributed to farmers  Equipment purchased and installed and in operation at the MNIB exporters trained; 125 farmers trained in post harvest principles; 50 per cent reduction in post-harvest losses  625 acres of fruits established; 125 new farmers producing fruits;  125 farmers trained in fruit production; Project officers trained in fruit production methods;</p>	<p>Project progress reports. Propagation station reports;  MNIB reports, project progress reports, rapid low-cost studies  Project progress reports: observations and interviews with farmers  Project progress reports: rapid low-cost studies</p>	<p>External funding is obtained     lands are available for fruit production; farmers are interested in producing fruits.</p>
<p><b>PROJECT ACTIVITIES</b> 1.1 procure equipment; 1.2 install facilities 1.3 hire propagators;  2.1 procure equipment; 2.2 install equipment; 2.3 provide training  3.1 select farmers; 3.2 propagate plants; 3.3 distribute plants; 3.4 provide technical support; 3.5 supervise credit;  4.1 select trainers; 4.2 train producers; 4.3 provide technical support</p>	<p>Investment Credit component Operating costs  <b>TOTAL</b></p>	<p>333,453 3,137,942 2,268,603  5,739,998</p>	<p>Funds are obtained for the implementation of the project; government support is maintained; farmers are interested in producing fruits</p>

## 2 BACKGROUND

### 2.1 Main features of the country, agriculture and the fruit sub-sector

#### 2.1.1 Main features of the country

The state of Grenada consists of Grenada, Carriacou and Petit Martinique, with Grenada being the largest island and accounting for approximately 90% of the total 133 square mile area. The population is around 90,000 (1992 estimates), growing at a rate of approximately 1% annually.

Real GDP grew by approximately 3% per year over the last decade. However, real agricultural output declined by approximately 10% over the same period, due mainly to low prices of traditional products, the increase of pests and diseases and high labour costs relative to product prices. These led to a general disinterest in agriculture and the abandonment of substantial quantities of arable acreages once under production. It is estimated that about 2000 hectares of abandoned lands are available for agricultural production if financially viable alternatives could be found.

Grenada experiences two seasons. A rainy season from June to December and a dry season running from January/February to May. The wettest periods of the year are between July to October, while the driest months are between February to May. Annual rainfall increases with altitude, ranging from around 1000 mm at the coastal areas to over 4000 mm in the more mountainous central parts of the island.

Generally, rainfall is adequate for most agricultural crops. Nevertheless, supplemental irrigation is usually required particularly to enable vegetable production during the dry season. The mean annual temperature is around 25 degrees Celsius. This temperature is quite suitable for the production of the fruits considered by this project (see Table 2.1).

**Table 2.1: Optimum climate requirements for various fruits**

Crop	Optimum Temperature	Water Requirement (mm)
Mango	25 - 31	1000 - 1200 mm
Avocado	25 - 31	1000 - 1200 mm
Sapodilla	05 - 31	400 - 1500 mm
Breadfruit	25 - 35	1500 - 2500 mm
Soursop	10 - 35	1000 - 2000 mm

Source: La Gra, J and Marte, R. 1987. The Fruit sub-sector in the Windward Islands: Diagnosis, Strategy, Actions. Inter-American Institute for Cooperation on Agriculture.

### 2.1.2 The agricultural sector

The farming sector in Grenada is dominated by small family-owned and operated farms. According to the 1981 agricultural survey (the last official survey conducted), out of a total of about 8200 holdings occupying approximately 5600 hectares, 49 per cent (occupying 6 per cent of total farm lands) were less than 0.4 hectare, 39 per cent (occupying 25 per cent of farm lands) were between 0.4 and 2.0 hectares, 9 per cent of the farms were between 2.0 and 4.0 hectares, 3 per cent were between 4.0 and 20.0 hectares and less than 1 per cent larger than 20 hectares.

As indicated in Table 2.2, the land is relatively hilly. Only about 10 per cent of the land area is between 0 degrees and 10 degrees slope, while almost half of the land is between 21 degrees and 30 degrees. Twenty percent of the area is of slopes greater than 30 degrees. These slopes suggest the need for soil conservation practices in any agricultural development initiative. Fruit production, particularly tree crops, is well suited to the observance of soil conservation measures.

**Table 2.2: Percentage of land area by slopes**

Slope	Per cent land area
0 - 5	5
5 - 10	5
11 - 20	19
21 - 30	48
> 30	20

Source: Vernon, K.C. et al. 1959. Soil and land use surveys Grenada. ITCA Trinidad.

Agriculture in Grenada accounts for about 20% of GDP, 40% of total employment and about 70% of merchandise export earnings. During the 1970's, the rate of growth of the agricultural sector averaged about 2% per year. Since 1980 however, real agricultural output has declined. A few crops, nutmeg, cocoa and banana dominate agricultural production. However, a wide variety of fruits and vegetables are also grown both for the local market and for export.

The overall goals set for the agricultural sector are increased agricultural exports, better soil and water conservation and increased generation of employment opportunities. Improved agricultural performance is critical to the attainment of these goals.

### **2.1.3 Main features of the fruit sub-sector**

#### **Past efforts at developing the fruit sub-sector**

Over the years the Government of Grenada embarked upon a number of programs aimed at developing the fruit sub-sector. The most visible example has been a five-year Agricultural Rehabilitation and Crop Diversification program funded jointly by the World Bank, the Caribbean Development Bank and the Grenada Government. This program was embarked upon in an attempt to achieve a more diversified agriculture. The program included components for institutional strengthening of agricultural extension, marketing and the provision of supporting infrastructure such as improvements in farm roads and plant propagation facilities. In addition, the Agricultural Rehabilitation and Crop Diversification Program sought to introduce new crops (flowers and vegetables), the replanting and rehabilitation of 400 hectares of bananas, 120 hectares of sugarcane, 16 hectares of coffee and 144 hectares of fruits.

A credit component to provide medium and long-term credit was built into the program. The intention was that through this facility, increased investment into agriculture, and in particular fruit orchards would result. However, this was not the case. Farmers were more willing to borrow for shorter-term crops such as bananas for which quicker returns could have been obtained. With the problems faced by the banana industry and the general uncertainty of the future of the banana production due to the European single market, farmers are more likely to accept viable alternatives.

The major stated areas of success of the program was in relation to the provision of infrastructure and institutional strengthening to support agricultural diversification. These included office space for both technical and extension personnel, a plant protection laboratory, equipment for the produce chemist laboratory, a communications unit within the Ministry of Agriculture and a new packing house and cold storage facilities at the Marketing and National Import Board (MNIB). The MNIB facilities include four chilling chambers and one air conditioned chamber for ripening fruits which together provide 20,000 square feet of chilling space and can handle approximately 45 tons of produce at any one time. This has created a good foundation upon which further crop diversification initiatives could be built.

### **2.2 Problems to be addressed**

Despite the past efforts at crop diversification and the government's stated commitment to develop non-traditional agricultural export, the performance of the fruit sub-sector over the past decade has not been very encouraging. A review and discussions with the various participants involved in the sub-sector revealed a number of problems ranging from pre-production to post-harvest handling which limit its development. Some of the more critical problems include:

- the unavailability of adequate planting materials; the plant propagation stations

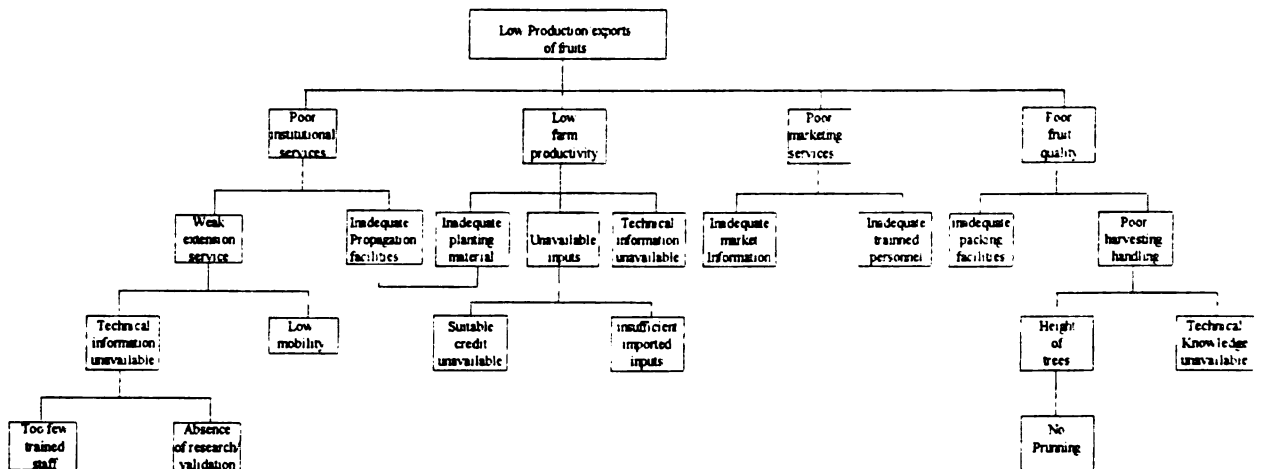
do not have the capacity to produce sufficient plants for the development of the sub-sector;

- fruits in Grenada are produced from trees scattered among a large number of farms over great distances (often only a few trees per farm); the trees are usually large due to the varieties used and the absence of pruning; this makes pest and disease management, other cultural practices and harvesting difficult and costly and increases post harvest losses;
- fruit trees are not usually fertilized which results in lower than potential yields;
- there is a lack of a credit regime particularly suited for the establishment of fruit orchards; due to the fact that tree crops have a long gestation period, farmers do not readily invest in the establishment of fruit orchards with the current credit regime;
- the extension personnel are not familiar with the required technical and methodological aspects of tree crop production and therefore are not competent to transfer them to fruit producers; this has resulted in technical information related to the various aspects of fruit production not being readily available to potential producers;
- farm production inputs are not usually available on time, in sufficient quantities or in the required formulations; as a result, farmers are forced to use whatever inputs are available;
- the fruit marketing system is underdeveloped and inefficient; there is a lack of market information and the fresh fruit exporters are inadequately trained in marketing; inadequate facilities and the rudimentary techniques employed in product harvesting, handling and transport leads to poor quality of the produce and high post harvest losses by the time it reaches the market;
- the packing line at the MNIB was not properly designed and the brushes on the line are not adequate for cleaning fruits; as a result, fruits with sooty mold and other foreign debris must be manually washed and cleaned resulting in increased costs;
- the transverse section of the packing line for drying fruits is not equipped with a blower and the counterflow section is unsuitable for grading and packing;
- due to the low volume of fruits handled, the packhouse is underutilized leading to high per unit overhead costs;
- there is an absence of technical assistance and training programs for fruit handlers to improve their operational efficiency;

- there is inadequate information and systems of grades and standards which makes pricing difficult.

To help place the problems identified above into better perspective, the problem tree below (see Figure 2.1) is presented. According to the problem tree, the central problem in the fruit sub-sector is low production and export of fruits. This problem arises from poor institutional support services, low farm productivity and the poor quality of fruits produced.

Figure 2.1: Problem tree for the production and marketing of fruits in Grenada



Poor institutional services to fruit producers stem mainly from weak extension services and inadequate propagation facilities to produce the necessary planting material. The weakness of the extension service in turn can be attributed to low mobility of the extension personnel and a general lack of familiarity with the technical and methodological aspects of the fruit production technologies which they are expected to effectively transfer to fruit producers. This lack of familiarity may be attributed to insufficient training of those personnel. The absence of research and on-farm validation of technologies have also contributed to a deficiency of technical information.

Low production/productivity of fruits may be directly attributed to insufficient availability of planting material due to the fact that the propagation station does not have the capacity to propagate sufficient fruit trees. Unavailability of proper inputs in sufficient quantities and a general lack of technical information have also contributed to low farm productivity. Furthermore, a lack of suitable credit particularly to procure investment and working capital for the establishment of fruit orchards have contributed to farmers not being able to increase production. Moreover, a general failure of the Ministry of Agriculture and farmers' organizations to liaise with importers to ensure the availability of inputs have also



been a contributing factor.

Poor marketing services have been the result of a general lack of market information on quantities, grades, prices etc. This is compounded by the inadequate technical capabilities of those providing the marketing services.

Poor fruit quality has been mainly due to inadequate packing facilities and poor harvesting and post harvest handling of fruits. Among the factors contributing to poor harvesting and post harvest handling are the height of the trees and a general lack of technical information related to post harvest handling by those involved in the fruit sector; viz. farmers, extension officers, private exporters and personnel at the Marketing and National Import Board and inadequate packing facilities. The proposed project aims at alleviating these constraints.

### **2.3 Documentation available**

Several studies/projects have been undertaken on the agricultural sector in general, and in relation to fruit production in particular, including:

- US and European Market Surveys for Selected Fruits and Vegetables Produced in the OECS, OECS/ADCU TROPRO West Indies Tropical Produce Support Project, December 1991;
- Import trends: Fresh fruit and Vegetables in EC and the Netherlands, Part 1.
- Import trends: Fresh fruit and Vegetables in EC and the Netherlands, Part 2.
- Antoine, P. and Taylor, T. 1993. Competitiveness of the Non-Traditional Agricultural Sector in the OECS: a Diagnostic Analysis Volumes 1 and 2.

The study by Antoine and Taylor (1993) is of particular interest since it has identified a number of crops which Grenada can be competitively produced and marketed.

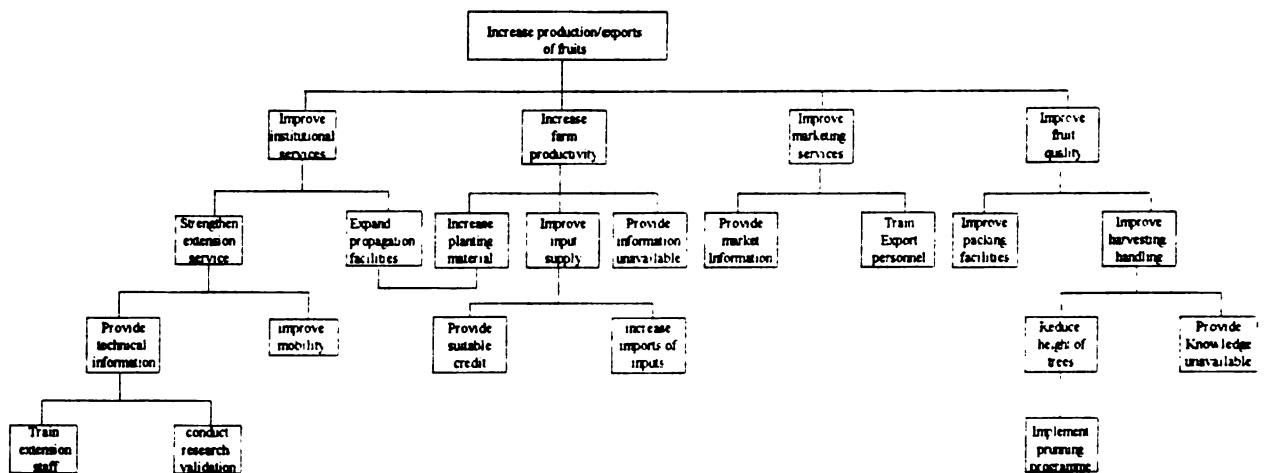
## **3 OBJECTIVES AND EXPECTED RESULTS**

### **3.1 Wider program objectives**

In Figure 3.1 an objective tree based on the problems identified which constrain the development of the fruit sub-sector in Grenada is presented. The overall objective of the

proposed project is to increase fruit production and productivity and thus contribute to Grenada's agriculture diversification efforts while at the same time contributing to the objectives for the overall sector, viz. to increase the competitiveness of the sector, increase the overall standard of living of farmers, to increase employment opportunities and foreign exchange earning capabilities.

Figure 3.1: Objective tree for the production and marketing of fruits in Grenada



### 3.2 Project specific objectives

The proposed project has the following specific objectives:

- to improve the institutional support services including plant propagation to facilitate the development of the fruit sub-sector;
- to increase the capabilities of the MNIB, PFU and private exporters in carrying out their marketing functions;
- to increase the acreage and volume of fruits produced and farm productivity;
- to improve the quality of fruits produced and marketed.

### 3.3 Project results

At the completion of the project, a number of results for achieving the project's specific objectives are expected. They include:

- an expansion of the plant propagation facilities and increased capabilities at Mirabeau to supply the increased demand for planting material;
- the packing facilities at the MNIB and PFU upgraded ;
- the capabilities of the Ministry of Agriculture to implement agricultural investment projects increased;
- increased capabilities of farmers in fruit production;
- 625 acres of fruit trees (440 acres of mango, 95 acres of avocado, 40 acres of soursop, 40 acres of sapodilla, 10 acres of breadfruit) established on 125 farmers holdings and fruit production and export increased;
- increased capabilities of private exporters, the Productive Farmers Union and Marketing and National Import Board personnel to conduct post harvest operations including marketing.

### **3.4 Project activities**

The project for the increased production of fruit in Grenada comprises a number of activities to alleviate the constraints and achieve the results identified above. These are described below.

#### **3.4.1 Provision of facilities for increased plant propagation**

In order to be able to meet the increased demand for planting material required for the development of the fruit sub-sector, additional facilities at the plant propagation station at Mirabeau will be required. The project will provide resources for:

- (i) concreting of an area which is presently covered by Saran where plants are held and the replacement of the existing saran material;
- (ii) concreting and the installation of a sprinkler irrigation system in an area for holding propagated plants adjacent to the saran area;
- (iii) construction of a gravel road so that the expanded plant holding area can be accessed by vehicles collecting plants;
- (iv) expansion of the area for soil sterilization into the present office and storage areas so that 2 batches of soil can be sterilized simultaneously; a second soil sterilization unit is already available;
- (v) construction of a small storage area adjoining the soil sterilization area;
- (vi) refurbishing of an existing building at the propagation station to serve as an office;

- (vii) provision of a long-wheel base land rover;
- (viii) provision of one bobcat; and
- (ix) increasing staff at the propagation station to propagate the plants required.

### **3.4.2 The strengthening of the capacity of the MNIB and PFU**

An efficient marketing system would be essential for the successful development of the fruit sub-sector. This would be achieved through:

- (i) the provision of training for personnel at the MNIB and PFU packing house in various aspects of post harvest handling of fruits; and
- (ii) the provision of equipment for upgrading the facilities at the MNIB; among the equipment which will be provided are:
  - (a) a fruit washing system equipped with tumbler brushes to remove dirt and foreign matter from fruits;
  - (b) a gas operated air dryer;
  - (c) a double manifold and pump system to dispense oil and other wetting solutions in mist form;
  - (d) 500 field crates for collection, transportation and storage of fruits;
  - (e) 1 stapling machine;
  - (f) a solar dryer;

the equipment to be provided at the PFU will include 100 field crates and a fruit washing system.

### **3.4.3 The establishment of a project implementation unit**

In order to be able to successfully implement the project, a project implementation team is to be established. The project would provide resources for:

- the recruitment of a Project Manager, a post-harvest specialist, three project officers and a project administrative assistant/secretary as part a project implementation team;
- training of the project officers:
  - (1) to familiarize them with the technical and methodological aspects of the technologies so they would understand the requirements and be able to effectively transfer them to fruit producers; and
  - (ii) to establish an efficient flow of information between the various

participants of the project (project management, the lending institution, fruit producers and exporters) so as to lead to an alleviation of the problems to increased fruit production and productivity;

- the monitoring and evaluation of the implementation of the project and the provision of feedback so that operational plans can be improved and actions taken where needed to correct shortfalls and constraints so that an efficient and effective performance can be attained.

#### **3.4.4 Increased fruit production acreages**

One of the critical problems identified above as constraining the development of the fruit sub-sector is low production and productivity of fruit trees. The major activities to be conducted to alleviate this problem include:

- the establishment of 625 acres of fruit trees;
- the provision of resources for credit for investment and working capital for the establishment of the orchards;
- the provision of training and technical assistance to fruit producers in various aspects of production;
- the improvement of the supply of inputs for production.

##### **The establishment of 625 acres of fruit trees**

The project will establish fruit orchards on 125 farms categorized into five farm models (see Table 3.1). Farm model 1 will comprise of one-acre of mango. It is proposed that there will be 40 of such farms. The second category of farm will consist of two-acre mango orchards. There will be 30 such units. There will be 25 units of five-acre orchards. These units will establish 1 acre of avocado and 4 acres of mango. There will also be 20 units of 10 acres. On these farms will be established 2 acres of avocado, 1 acre each of soursop and sapodilla and 6 acres of mango. The final farm model will comprise of 20 acre units consisting of 3 acres of avocado, 2 acres each of soursop and sapodilla, 12 acres of mango and 1 acre of breadfruit. There will be 10 such units.

To increase the financial attractiveness of the establishment of the orchards, various intercrops will be used. These would include papaya, sorrel and hot pepper.

##### **The provision of credit for fruit production**

The Grenada Development Bank will be responsible for the implementation of the credit activity. The objective is to stimulate investment in fruit trees by providing long-term credit (investment and working capital excluding the cost of family labour) and therefore increase the capacity of farmers to contribute to agricultural diversification. The goal is to provide credit for the establishment of the orchards and working capital for three years after

establishment for 125 producers involved in the production of 625 acres of fruits.

Because of the nature of tree crop production, all credit including those for fertilizer and pesticides will be treated as long-term. A grace period of five years after the planting of the orchards will be given. However, the borrowers will be expected to make interest payments at a rate of 10 per cent per annum. The loans are to be repaid over a six year period. For example, for a loan given at the end of year 1 to establish an orchard in year 2, repayment of principal would begin in year 7 and made until year 12.

**Table 3.1: Farm models and acres of fruit trees to be established**

Farm Models	Size acres	Number	Avocado acres	Mango acres	Soursop acres	Sapodilla acres	Breadfruit acres
Model 1	1	40	0	1	0	0	0
Model 2	2	30	0	2	0	0	0
Model 3	5	25	1	4	0	0	0
Model 4	10	20	2	6	1	1	0
Model 5	20	10	3	12	2	2	1
<b>TOTAL</b>		125	95	440	40	40	10

In addition to the credit for the establishment of the orchards, short-term credit will also be given for the establishment of papaya, hot-pepper and sorrel as intercrops. However these are to be repaid at the end of one year. A rate of interest of 10 per cent will also apply.

To help enhance the success of the credit program and reduce the possibility of default, security will be required for the credit. Additionally, credit would be given only after a thorough assessment of the capacity of the borrower to successfully produce the orchards and repay.

Because credit programs will attract users and uses for which they were not intended, the field agronomist in collaboration with the Bank's credit officers will be required to certify that applicants meet the criteria for credit. Furthermore, credit will be given for the reimbursement of expenses upon certification by the project officers/bank credit officers that the work has been carried out.

#### Provision of training and technical assistance to fruit producers

In order to ensure that the farmers will be able to properly adopt the required fruit production technologies, the project will provide resources for a number of training sessions. At these training sessions, the requirement of the technologies will be demonstrated and explained. In addition, through the institutional strengthening component, trained project

officers would provide technical assistance to the participating farmers.

#### The improvement of the required supply of inputs for production

To ensure that the required inputs are available on time and in the correct formulation, the project management will liaise with importers of inputs after consultations with farmers' organizations and other institutions involved in the project. They will be advised of the types and estimated quantities of inputs which will be required based on the crop production schedules. The required planting materials will be made available as a result of the expanded capacity of the propagation station at Mirabeau.

#### **3.4.5 Increased capabilities in post-harvest operation**

As cited above, a critical area to be addressed for the development of the fruit sub-sector is that of fruit quality improvement. The major activities to be undertaken to achieve this result would include:

- the strengthening of the post-harvest capacity of the Marketing and National Import Board and the Productive Farmers' Union;
- the improvement of the capabilities of farmers in areas of pre-harvest, harvesting and post-harvest handling of fruits;
- the provision of training to private exporters in the areas of post-harvest handling and marketing;
- the provision of support for marketing.

#### The improvement of the capabilities of farmers

In order to help improve the quality of fruits, resources would be provided by the project to train farmers so that quality can be improved. Among the areas in which training would be given are:

- (i) pruning of trees so as to improve fruit quality;
- (ii) methods of fruit harvesting;
- (iii) post harvest handling including grading and packaging.

#### Provision of training to private exporters

In addition to the Marketing and National Import Board and the Productive Farmers' Union, private exporters are expected to play an integral part in the exportation of fruits to be produced by the project. Resources will therefore be provided by the project for training to those exporters to increase their capabilities and efficiency.

## 4 IMPLEMENTATION OF THE PROJECT

### 4.1 Physical and non-physical means

#### 4.1.1 Provision of facilities for increased plant propagation

Based on the proposed acreages of the various types of fruit trees to be produced, a substantial increase in the output of the propagation station would be required. The number of plants to be established in the second, third, fourth and fifth years of the project are presented in Table 4.1.

**Table 4.1: Annual number of plants expected to be established**

Plants	Plants/acre	Year 2	Year 3	Year 4	Year 5	TOTAL
Avocado	48	480	1440	2640	0	4560
Mango	70	5950	14000	7350	3500	30800
Soursop	300	0	3000	3000	6000	12000
Sapodilla	48	0	0	0	1920	1920
Breadfruit	48	0	0	0	480	480
Papaya	400	38000	96000	68000	48000	250000

The resources required for the refurbishing of the plant propagation station are presented in Table 4.2.

**Table 4.2: Resources for upgrading the plant propagation station at Mirabeau**

Land rover	28500
Store room	3200
Office	10500
Sprinkler irrigation system	3000
Concreting saran shed area	17200
Concrete water tank	3000
Saran material	6667
Access road to holding area	7000
Concreting distribution area	23508
Installation labour costs	20000
Bobcat	26000
Propagation supplies	113000
Propagation support staff	150000
<b>TOTAL</b>	<b>411575</b>



In addition to the refurbishing of the station, a long wheel-base land rover costing US\$28500 and a Bobcat costing US\$26000 will be purchased. The land rover is to be used for obtaining budwood and other supplies required for the day-to-day activities at the station. The bobcat would be used mainly for obtaining and moving soil for plant propagation. Furthermore, the project will provide resources for 8 propagation support staff during the first four years. The total estimated cost of this activity is US\$411,575.

#### 4.1.2 The strengthening of the capacity of the MNIB and the PFU

The strengthening of the capacity of the MNIB to perform its fruit marketing function would require the purchase and installation of equipment. The equipment required and their costs are presented in Table 4.3.

Table 4.3: Resources required for strengthening the MNIB

Resource requirement	Cost US\$
Equipment upgrading	
Transverse washer and eliminator	29000
Gas operated air dryer	28000
Double manifold and pump system	3800
500 field crates @ \$60 each	30000
4 blanket type ethylene extractors	400
1 stapling machine	500
Inland freight, shipping and insurance	8000
Design and installation of system	10000
1 solar dryer	20000
<b>Total equipment upgrading</b>	<b>130200</b>

For the PFU, the project will provide US\$25000 for purchasing 100 field crates and for improving their fruit washing system.

#### 4.1.3 The establishment of a project implementation unit

To successfully implement the project, a project implementation unit will be required. The resources required are presented in Table 4.4. The resources include one micro-computer, one laser printer, software, and office furniture. Also included are personnel for the project implementation unit. Resources for the support of the implementation of the project such as for communication, office supplies, training, vehicle operation and monitoring and evaluation of the implementation of the project will also be provided. The total required resources amount to US\$1.24 million.

#### 4.1.4 Increased fruit production acreages

The resources required for fruit production will be the responsibility of the participating farmers. Estimated material input requirement for producing the 625 acres of fruit trees plus the papaya, hot pepper and sorrel which will be intercropped during the early years are presented in Table 4.5 .

**Table 4.4: Resource requirement for the project implementation unit**

Resource requirement	Cost US\$
<b>Equipment</b>	
1 microcomputer	4000
1 printer	3000
<b>Software</b>	2000
1 battery stabilizer	1000
2 desks	2000
1 computer table	250
1 computer chair	150
2 office chairs	600
1 fax	800
<b>Total equipment</b>	<b>13800</b>
<b>Personnel</b>	
Project Manager	300000
Administrative assistant	128000
3 field agronomists	373000
Post harvest specialist	288000
Chauffeur	30000
<b>Total personnel</b>	<b>1,119,000</b>
<b>Other costs</b>	
Travel and per diem	12000
Communication	15000
Office supplies	16000
Training	20000
Vehicle maintenance	20000
Vehicle insurance (5%)	10000
Monitoring and evaluation	28000
<b>Total other costs</b>	<b>121,000</b>
<b>TOTAL</b>	<b>1,240,000</b>

#### Fertilizer

Current fertilizer consumption for fruit-tree crops is minimal since they are established scattered with other crops. The tree crops may only receive fertilizers (mainly NPK and sulphate of ammonia) when the other major crops are fertilized. On the basis of the proposed planting schedule of the various crops at full development of the project, approximately 121

tons of fertilizer will be required. The estimated annual requirement can be observed in Table 4.5. Existing supply channels would be able to handle the increased demand without difficulties.

**Table 4.5: Material input requirement for farm production**

Material input requirement	Units	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10-16
Roundup	Litres	285	1005	1515	1875	1590	870	360	0	0
Gramoxone	Litres	190	670	1010	1250	1060	580	240	0	0
Fertilizer	Tons	43	142	186	178	121	116	121	121	121
Benlate	Kgs	43	100	110	73	66	258	467	1076	1155
Champion	Kgs	110	400	460	290	66	183	317	476	555
Malathion	Litres	265	938	1235	1068	425	150	140	140	140
Reglone	Litres	95	325	495	605	530	290	120	0	0
Orchex		1025	3470	5120	6580	6865	6850	7200	7200	7200
Foliar spray	Kgs	91	307	409	375	182	0	0	0	0

### Herbicides

Roundup, reglone and gramoxone will be the three main types of herbicides required by the project. Their annual requirement can also be observed in Table 4.5. No problems are envisaged in obtaining the required supply if importers can be advised early.

### Other agro-chemicals

The other agrochemicals which would be required for farm production by the project are also presented in Table 4.5. Again, no difficulties are envisaged in obtaining these supplies from the existing supply channels once the suppliers are informed in advance.

### Farm equipment and tools

Various types of farm equipment will be required at the farm level for production. These include bow saws, hand pruning saws, mist blowers, chain saws, forks, spades, files, cutlasses, etc. . These will be purchased by the farmers using credit received. Equipment such as files, cutlasses, forks, spades are generally readily available in sufficient quantities. Adequate supplies of other types of equipment such as bow saws, hand pruning saws, weed eaters, mist blowers and knapsac sprayers will be ensured through liaison with importers of these equipment, farmers and farmers organizations. The estimated quantities of some of the major tools and equipment which will be required by the various farm models is summarized in Table 4.6.

## Credit

The substantial increase in acreage of tree crops would require a large increase in production credit. The project would implement a system of "supervised credit" ensuring that technical services to the borrowers are provided so that the recommended practices such as varieties, spacing, fertilizer, agrochemical inputs pesticide etc. are adopted.

Long-term credit will be required to enable farmers to meet the costs of establishment and maintenance of fruit orchards until the bearing stage. Short-term credit will also be required for the establishment of intercrops. Based on the projected production costs and the rate of establishment of the orchards, the total credit requirement will amount to US\$3,137,942 as illustrated in Table 4.7.

**Table 4.7: Resources required for the credit program (Constant US\$)**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
<b>Annual funds requirement</b>	391889	679042	470115	534569	436749	304631	218112	102837
Short-term	124012	259147	59767	49230				
Long-term	267877	419894	410348	485339	436749	304631	218112	102837
Total short-term	492156							
Total long-term	2645786							
<b>TOTAL</b>	<b>3137942</b>							

If a rate of inflation of 5 per cent per annum is assumed, the total amount of current dollars which will be required for the credit programme would amount to US\$3.598. A more detailed breakdown is presented in Table A3.27 of Annex 3.

### **4.1.5 Increased capabilities in post-harvest operation**

The resources required for increasing the capabilities of farmers, private exporters and MNIB personnel in post-harvest operation are presented in Table 4.8.

**Table 4.8: Resources required for increasing capabilities in post-harvest operations**

Resource requirement	Costs US\$
Training fruit exporters and farmers	20000
Marketing/product promotion	300000
Consultant (post harvest operation)	20000
<b>TOTAL</b>	<b>340,000</b>

An experienced consultant would be hired to study the operation of the post harvest system, determine the inefficiencies and the points in the system at which losses occur. Based on the study, the consultant is to develop an easily implementable system to reduce post harvest damage and improve fruit quality.

## **4.2 Implementation procedures**

### **Project organization and management**

The day-to-day responsibility for the implementation of the project will rest with the Project Manager. The terms of reference for the Manager is presented in Annex I. This includes overseeing the rehabilitation of the propagation station at Mirabeau. Other project staff will include a project administrative assistant/secretary, three field agronomists and a post-harvest specialist. Additional staff will be hired to work at the propagation station so that the increased demand for plants may be met. This will consist of 8 agricultural workers and 1 chauffeur to complement the present propagation staff.

To overcome the fact that lack of effective coordination of the various activities of the project could hamper its effective implementation, a Fruit Development Committee would be set up comprising of membership of the Ministry of Agriculture, the Productive Farmers' Union, the Marketing and National Import Board, the Caribbean Agricultural Research and Development Institute (CARDI), the OECS/ADCU's local representative, the Inter-American Institute for Cooperation on Agriculture (IICA), the Grenada Development Bank (GDB) and the Project Manager. The Chairperson of this committee would be from the Ministry of Agriculture. This committee would provide for the coordination of the activities of the different participants in the fruit sub-sector. It would meet at least every three months to review the project activities and achievements and consider any changes that may be needed.

Links between the OECS/ADCU and TROPRO projects related to the OECS agricultural diversification and marketing will be strengthened. This is especially important in relation to the work which is being done, for example the trial shipments of containerized mango.

### **Credit disbursement**

The proposed credit channel would be the Grenada Development Bank. It would administer the loans after proper appraisal of the borrower. The principal terms and conditions under which credit would be made available would be:

- a grace period of five years after the planting of orchards will be given during which time only interest will be paid; this is to be consistent with the funds the bank receives;

- security to be provided in accordance with the Grenada Development Bank's normal requirements;
- an interest rate of 10 per cent will be charged to cover the Bank's loan administrative cost, the cost of the funds it receives and its requirements for profits as a basis of the future expansion of its lending operations;
- the borrowers are expected to meet the cost of their labour used on the farms;
- a system of supervised credit will be used to enhance the success of the program;
- among the qualifying criteria, consideration will be given to the skills of the borrowers in managing the enterprise and their credit rating .

In order to facilitate the disbursement of credit to fruit producers, work/farm plans would be developed by the project implementation team and the GDP credit officers.

#### Technology transfer and training of field agronomists

The project officers will be the crucial link between available technological information and the participating farmers. In order for them to have an impact, it is most important that they are fully competent to advise farmers. A training schedule will be designed to take place once a month and will concentrate on a few salient points to ensure that the required degree of competence is achieved. Trainers will be drawn from the Ministry of Agriculture, CARDI and IICA etc. Because the best way for the field agronomists to appreciate and learn the operation of the technical aspects of their message is to see it in operation, the training sessions will be conducted on a farm that would best illustrate the problem at hand and allow both the field agronomists and contact farmer to participate.

To make the transfer of technologies more effective, an operational system which is simple to organize and easy to supervise and in which the message would be clear would be developed. The message will be geared to cover general crop husbandry, plant protection, harvest and post harvest operations.

The project would share the services of subject matter specialists based in the Ministry of Agriculture, CARDI, IICA etc. They would provide for training the field agronomists, particularly in the disciplines of crop protection, and general crop husbandry. They will also provide support in the training of farmers.

#### Farmer Training

To ensure that the technology generated is transferred to farmers, several farmer training workshops and seminars would be organized annually as a means of effecting such transfers. These would be the responsibility of the project implementation team with support

from technical specialists. The training sessions would be designed such that farmers would be trained in the more important problems at hand.

### Training in post harvest handling

The training of farmers, private exporters, PFU and MNIB personnel in post harvest handling will be conducted with support from personnel of the Ministry of Agriculture, IICA and CARDI etc. In addition, technical support for training of MNIB personnel in the operation of the packing line, grading and packaging will be provided by consultant services to be funded by the project. Consultants with practical experience would be selected. Training of private exporters in grading and packaging will be conducted jointly with MNIB personnel by consultants.

### Work plan development

Detailed monthly work plans will be developed during monthly meetings between the project officer, post harvest specialist and the Project Manager. This plan would set out in fortnightly periods the target operations on which the project officers would concentrate. Only the major constraints would be selected. These plans would be developed in collaboration with subject matter specialists providing support to the project.

### Transport

The field agronomists will be given a basic travel and mileage allowance for operational travel. One long-wheeled base land rover will be purchased for use at the propagation station for obtaining budwood and other necessary inputs on a day to day basis.

### Selection of participating farmers and planting material distribution

Every year, beginning from year 1 of the project, the project officer together with the general extension staff and the PFU will identify farmers and the acreages of the different crops which they intend to plant in the next year. For this purpose, prepared plant application forms will be used. This information will be collated and passed to the plant propagation personnel so that the required plants can be propagated. The project officers will then keep in close contact with the farmers and give technical assistance for the preparation of the areas for planting. The farmers would be responsible for the collection and transportation of their plants.

### Improvement of input supplies

Having identified the farmers who are expected to participate in the project each year and the anticipated acreages to be planted and those already established, estimates of the input requirement for the next year will be made by the project implementation unit in collaboration with those agencies providing technical assistance and training. The information will be given to the importers of agricultural inputs so that they would have a guide as to quantities of

inputs which should be imported. In addition, the PFU would be encouraged to import supplies for their member farmers.

#### Procurement of equipment

Equipment required by the project will be procured according to the regulations of the funding agency. Those required for the upgrading of the facilities at the MNIB for example, would be submitted by the MNIB to the Project Manager. Similarly, those required for the upgrading of the propagation station will be prepared by the propagation station personnel and submitted to the Project Manager. This will be done in advance so that they can be ordered and installed on time.

#### Plant protection

The methods established for crop protection will be rigorously encouraged. For spraying their crops, the farmers will purchase the pest control chemicals. Farmers will be expected to purchase their knapsac sprayers for herbicide and pesticide application. Because of the cost involved in purchasing mist blowers, farmers with less than 5 acre orchards will not be expected to purchase them. Instead they will be able to rent them as required. However farmers with larger acreages are expected to purchase their own mist blowers.

To support the expected plant protection activities, farmers will be trained to be able to spot and evaluate pest and disease outbreaks. The appropriate training will be given by the plant protection unit of the Ministry of Agriculture, IICA and CARDI etc.

### **4.3 Timetable for implementation**

The life of the project will be 16 years. During the first year, personnel would be recruited, equipment procured for the propagation station and Marketing and National Import Board and PFU, the propagation station rehabilitated, project officers trained. The establishment of the fruit orchards are to take place during years 2 through 5 as presented in Table 4.9. Plants required for establishing 15 per cent of the acreage will be propagated for planting during the second year. In the third year 38 per cent of the orchard will be established. Twenty-seven per cent of the orchards will be established in the fourth year while the rest (19 per cent) would be established in the fifth year.

The schedule for establishment of acreages on the various farm models are presented in Table 4.10. The model 1 type farms would establish their one acre of fruit trees during the third year of the project. The model 3 type farms which consists of 5 acres would establish 1 acre in the second year of the project and 2 acres in the third year and 2 acres in year 4.



**Table 4.9: Acreages of various crops to be planted by years**

Crop types	Year 2	Year 3	Year 4	Year 5	Total
Avocado	10	30	55	0	95
Mango	85	200	105	50	440
Soursop	0	10	10	20	40
Sapodilla	0	0	0	40	40
Breadfruit	0	0	0	10	10
<b>TOTAL</b>	<b>95</b>	<b>240</b>	<b>170</b>	<b>120</b>	<b>625</b>

**Table 4.10: Proposed planting Schedule on the various farm types**

	Year 2	Year 3	Year 4	Year 5	Year 2	Year 3	Year 4	Year 5
	Acres				Percentage			
Farm 1	0	1	0	0	0	100.00	0	0
Farm 2	0	2	0	0	0	100.00	0	0
Farm 3	1	2	2	0	0.20	0.40	0.40	0
Farm 4	2	2	3	3	0.20	0.20	0.30	0.30
Farm 5	3	5	6	6	0.15	0.25	0.30	0.30
<b>TOTAL</b>								
Acres	95	240	170	120				
Percent	0.15	0.38	0.27	0.19				

The implementation schedule of the project activities by components is shown in Table 4.11.

#### 4.4 Project cost estimate and financing plan

##### Costs

The costs of implementing the project are estimated at US\$2.27 million exclusive of adjustments for inflation (Table 4.12). In addition, US\$3.14 million will be required for the credit program (US\$0.49 million for short-term credit for inter-crop production and US\$2.65 million for tree crops). The total amount of resources which will be required in constant terms is estimated at US\$5.74 million. The amounts in current dollars can also be observed in Table 4.12.

Table 4.11: Implementation schedule of the major project activities

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	YEARS															
Refurbish propagation station	x															
Recruit project implementation team	x															
Procure vehicles	x															
Recruit additional propagators	x															
Train project officers	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Establish credit program	x															
Monitor project implementation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Evaluate project implementation																
Propagate plants	x	x	x	x	x		x								x	
Select participating farmers	x	x	x													
Disburse loans	x	x	x	x	x	x	x	x								
Establish fruit orchards		x	x	x	x											
Train fruit producers		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Liaise with input importers	x	x	x	x	x	x	x	x								
Upgrade MNIB/PFU facilities	x															
Provide post-harvest training to exporters, MNIB staff, PFU staff & farmers		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

**Table 4.12: Cost of the project by category**

Cost category	Constant US\$	%	Current US\$
Capital costs	333,453	5.8	333,453
Credit component	3,137,942	54.7	3,597,955
Operating costs	2,268,603	39.5	2,639,866
<b>Total Project Cost</b>	<b>5,739,998</b>	<b>100.0</b>	<b>6,571,274</b>

A breakdown of the percentage share of each main category in total project cost is also presented in Table 4.12.

### Financing

The project is to be financed by both external and local resources. External resources will be required for investment, the credit component and the implementation of the project during the first six years. Thereafter, local resources will be used for the continued implementation of the project. The amounts of external and local financing required by project years is presented in Table 4.13.

The total amount of external resources required in current dollars would amount to US\$5.177 million, while local contribution would amount to US\$1.395 million. See Table A6.27 for further details.

**Table 4.13: Project implementation funds flow analysis (constant US\$)**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Years 10-16
Production credit	391889	679042	470115	534569	436749	304631	218112	102837	0	0
Short term	124012	259147	59767	49230	0	0	0	0	0	0
Long-term	267877	419894	410348	485339	436749	304631	218112	102837	0	0
Total short term	492156									
Total long term	2645786									
TOTAL	3137942									
Project implementation	516941	232838	195353	186323	176663	134663	0	0	0	0
TOTAL	1442778									
Total external resources	908830	911879	665467	720891	613411	439293	218112	102837	0	0
Local contribution	0	0	0	0	0	0	82478	81428	81428	81428
External resources required	4580720									
Total local contribution	825825									

\*An additional US\$10000 will be required in year 15 for a full project evaluation making the local contribution in that year US\$91428

#### **4.5 Special conditions:**

A number of conditions would be required for the successful implementation of the project. Among the more important are the fact that:

- the Project Manager would prepare an annual implementation schedule for the project;
- separate accounts would be established and maintained for the project expenditures by the project directorate; these accounts would be audited annually by an independent auditor; accounts of GDB loans to project farmers would be identifiable and audited annually; copies of both audited reports would be submitted within three months of the close of each financial year;
- the GDB would provide credit to farmers under terms and conditions arrived at through discussions with project management such that their participation in the project will be financially viable;
- the project management in collaboration with the Ministry of Agriculture Planning Unit would be responsible for carrying out project monitoring;
- The Ministry of Agriculture planning unit and IICA will be responsible for periodic evaluation of the project.

## **5 OTHER FACTORS AFFECTING SUSTAINABILITY**

### **5.1 Policy support measures**

It has been generally recognized by the Grenada Government that agriculture must be fully exploited as a means of generating employment, foreign exchange and increasing the standard of living of the farming population. In addition, it is generally agreed that the competitiveness of the agricultural sector must be increased. The strategy for achieving these goals include the diversification of the agricultural export base.

During the decade, there has been interest among agricultural policy makers in the production of non-traditional crops. Attention has focused on fruits because of such factors as the existing export market demand, its potential to stimulate the development of domestic agro-processing its suitability for inclusion within the existing farming systems and the fact that both small and large farmers could be beneficiaries. The development of the fruit sub-sector features highly in the national agricultural diversification plan.

The plan calls for actions to be directed at:

- the encouragement of the development of non-traditional export;
- institutional reform and the modernization of the agriculture through the provision of increased inputs and the improvement of agricultural research and information dissemination;
- the improvement of agricultural infrastructure;
- the improvement of the environment for agricultural production through better agricultural policies;
- the conservation and development of natural resources including the more efficient use of land, forest and water and the conservation of bio-diversity and ecological balance.

With respect to diversification of the agricultural sector, the plan calls for a focus on fruits. According to the plan, areas in which attention will be given include nursery infrastructure, germplasm bank, input supply, agricultural zoning, support to farmer organizations, credit for production and export, market development and market information systems.

In the past, there were no consistent policies in regard to land use. As a result, agricultural lands were used for non-agricultural purposes such as housing and tourism related activities. In addition, estates have been parcellised and distributed to farmers, in most cases into small uneconomic units. In the development plan, support is given to policies which will aim as far as possible to keep agricultural land under agriculture. Among the measures proposed are the zoning of lands which are to be used for agricultural purposes and forest only, the discouragement of the fragmentation of land into small uneconomic units and the encouragement of the use of conservation measures.

A more recent policy aimed at supporting the development of the fruit sub-sector has been the Fresh Produce Act of 1993 which provides guidelines for the exportation of fresh produce and connected matters. To enhance the quality of produce exported, exporters will be required to obtain an annual licence. This licence will only be issued after there is satisfaction that the facilities for cleaning, grading and storing the produce meets minimum set standards. The packages for packing the exports must also be satisfactory. Before produce can be exported, they are to be certified by inspectors.

The government has agreed to provide exemptions of duty for the purchase of equipment to be used by the project. Furthermore, the government has agreed to provide the necessary administrative installations and services for the execution of project activities.

## **5.2 Appropriate technology**

Efforts would be made to ensure that appropriate technologies which can be easily adopted by farmers are utilized as part of the implementation of the project. In particular, before dissemination, steps would be instituted to ensure that the production packages developed are properly validated and that they can be incorporated within the farm system.

## **5.3 Environmental protection measures**

The activities proposed for the project are not expected to result in serious negative environmental impacts. In the area of pest and weed control, cultural practices would be combined with chemical and mechanical use, thereby reducing the need for chemicals and minimizing possible environmental degradation. For example, a combination of mechanical and chemical weed control will be used in the orchards up to the fourth year after establishment. Thereafter, only mechanical weed control using line cutters is proposed. In the case of pesticides the application will be determined by pest levels as determined by scouting. This will be supplemented by training in the safe use of pesticides and integrated pest management as part of the overall training of fruit producers.

Soil conservation would be foremost in any land preparation methods employed. Training would be given in soil conservation and land cultivation practices. Precautions would be taken to reduce soil erosion especially during the land clearing and planting stages.

These issues as well as overall sustainability in terms of the economic, social, and ecological costs of long-term continuation of the project and the maintenance of benefits will be considered during project implementation.

## **5.4 Sociocultural and legal aspects**

The project will be implemented by the Project Implementation Unit. However, the credit component will be handled by the Grenada Development Bank which has the legal and institutional framework for such an activity. To enhance participation of farmers in the credit program, flexible terms will be offered. Both men and women would be involved in fruit production. The project is gender neutral.

## **5.5 Institutional and management capacity**

The setting up of a Project Implementation Unit and the Project Management Committee would provide the necessary institutional and management capacity for successfully implementing the project.

## 6 FINANCIAL AND ECONOMIC VIABILITY

### 6.1 Expected yields and production

The climatic conditions in Grenada (temperature and rainfall) are excellent for the production of a wide range of fruits as can be observed in Table 2.1. There seems to be no serious constraints to achieving high fruit yields. Achieving optimum yields would largely be a matter of correctly applying the necessary inputs into the crop management program (fertilizers, weed, pest and disease control measures, pruning etc.).

The estimated annual marketable crop yields per acre are presented in Table 6.1. Here, year 1 represents the year of establishment. These expected crop yields are quite conservative. Upon full maturity, avocado for example is expected to produce 11000 pounds of marketable fruits per acre. This would amount to around 225 pounds per tree. Similarly, mango is expected to produce 12000 pounds per acre or an average of around 170 pounds per tree. In the case of papaya, 16000 pounds is expected in the first year. In the second year, only 8000 pounds per acre is expected. The rationale is that due to the fact that bunchy top disease is present in Grenada, about half the plants would have been infected with the disease. By the end of the second year, it is assumed that most of the plants would be infected. Hot pepper is estimated to yield 20000 pounds per acre while 6000 pounds per acre of harvested sorrel (before drying) is expected .

Based on the proposed planting schedule and acreage of each crop, the estimated annual total marketable yield from the project is presented in Table 6.2. To put these volumes into better perspective, they are expressed as a percentage of total EEC and UK imports during 1992. As indicated by Table 6.3, at full production, avocado would amount to less than half of one per cent of total EEC imports and just under 2 per cent of imports into the UK. With respect to mango, the output of the project would be equivalent to just under 4 per cent of total imports into the EEC and around 11 per cent of UK imports.

**Table 6.1: Estimated yields per acre of fruit by crops by years (lbs)**

Crop	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Years 10-16
Avocado			675	1600	2400	6500	9000	11000	11000	11000
Mango			0	960	2400	8000	9000	12000	12000	12000
Soursop			6000	12000	15000	18000	20000	22000	22000	22000
Sapodilla			350	630	840	1000	1200	1200	1200	1200
Breadfruit			2400	12000	15000	25000	28000	28000	28000	28000
Papaya	16000		4000							
Hot pepper		20000								
Sorrel		6000								

**Table 6.2: Estimated total output of various crops by project years (Tons)**

Crop types	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12-16
Avocado			3	16	49	100	186	329	417	467	467
Mango				36	177	563	1190	1688	2127	2290	2357
Soursop				27	80	174	254	304	348	375	393
Sapodilla						18	71	107	161	214	214
Breadfruit						11	54	67	112	125	125
Papaya	286	821	946	875	286						
Hot pepper	379	893	982	647							
Sorrel	33	268	321	194							

**Table 6.3: Project output as a percentage of total EC and UK imports of selected fruits**

	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 11-16
<b>Avocado</b>										
% EC imports	0.00	0.00	0.00	0.01	0.03	0.06	0.10	0.19	0.24	0.26
% UK UK imports	0.00	0.00	0.01	0.06	0.19	0.40	0.75	1.32	1.67	1.87
<b>Mango</b>										
% EC imports	0.00	0.00	0.00	0.06	0.29	0.91	1.93	2.73	3.45	3.71
% UK imports	0.00	0.00	0.00	0.18	0.88	2.81	5.95	8.43	10.63	11.45
<b>Papaya</b>										
% EC imports	2.61	7.51	8.65	8.00	2.61	0.00	0.00	0.00	0.00	0.00
% UK imports	9.62	27.65	31.86	29.46	9.62	0.00	0.00	0.00	0.00	0.00

## 6.2 Viability at the Farm-level

An important pre-requisite for the success of the program is that it must be profitable to produce fruits at the farm level. Otherwise, farmers would not be willing to become involved in fruit production. The bases for the preparation of the farm budgets are the crop enterprise budgets which present per acre production costs and incomes. These budgets are determined by financial price estimates, the yield projections and the input requirements. See Tables A3.1 - A3.12 of Annex 3.

For the intercrops, the costs of activities which would have been done by the main tree crops in the absence of intercropping are not charged to the intercrops. Only the incremental costs as a result of the presence of the intercrops are charged.

Farm incomes for the various farm models are computed and presented in Table 6.4. Full details can be observed in Tables A3.13 to A3.17 of Annex 3.

For the 1 acre farm model, the net present value (at 12 %) of all resources utilized in the production on that farm would amount to US\$5,456. A rate of return of 87% can be expected. This high rate of return to resources is mainly due to the fact that in the year of establishment of the mango orchard, half acre each of sorrel and hot pepper are also planted. These are harvested



during that same year. The next year, one half acre each of sorrel and hot pepper is again planted. The hot pepper will be planted on the area which was previously planted to sorrel. The high returns to the inter-crop provides sufficient funds such that the accumulative farm balance after financing remains positive for every year of the project despite the fact that during the early years, after the inter-crop, the net benefit before and after financing was negative.

The net present value for the 2 acre farms which also comprised mango as the tree crop was US\$7,770. The internal rate of return was 55%. This lower rate of return to total resources utilized relative to the 1 acre farm is due to the nature of the intercrops produce. On these farms, 1 acre is to be planted with papaya. Based on the assumption that 50% of the crop would be destroyed by bunchy top disease, after the first year, and that it would be totally destroyed after two years, a lower return than if the farm had utilized intercrops of hot pepper and sorrel would result. Nevertheless, the rate of return is in excess of that discount rate in the economy.

For the 3 acre, 4 acre and 5 acre models, the net present values are US\$27,254, US\$49,302 and US\$111,865 respectively. The internal rates of return for those farm acres are 69%, 58% and 69% respectively. Again these are in excess of the discount rate for the economy.

As with the one-acre type model, the accumulative balance of funds for all years for the other farm models are positive, despite the fact that tree-crops are also involved. This is again due to the presence of the intercrops in the system.

Sensitivity analyses are conducted to determine the effects of various shortfalls in anticipated yields, changes in the farmers' price of fruits, changes in input costs, etc. on the financial viability of fruit production to ensure that unacceptable levels of risks do not exist. Downside sensitivities of the farm model results include the effects of a 20% lower than expected farm yields; a 20% lower than expected farm gate prices a 20% higher than anticipated farm production costs; and combinations of yield, price and cost effects. The results are summarized in Table 6.5. More detailed results can be observed in Tables A3.18 to A3.23.

According to the downside sensitivities, if yields of crops were to decrease by 20%, the rate of return and net present value to Farm Model Type 1 would fall from 87% to 45% and from \$5456 to \$2487 respectively. That is, the return would be almost halved. A 20% lower than expected yield for the other farm models would also result in the return to the other farm decreasing by almost half the levels obtained in the base model. A 20% decrease in the farm gate price would produce a similar effect as a fall in yields.

If production costs were to increase by 20%, the effects on the financial viability of the project would not be as drastic as a yield or price reduction. For the Farm Model 1, the internal rate of return would fall to 59%. The return will be 14% higher than if yields or farm gate prices were to fall. The effects on the other farm models to a production cost increase would be similar.

**Table 6.4: Farm Models, Net Benefits, Accumulated Balance, Net Present Value and Internal Rate of Return**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Farm model 1</b>																
Net benefit before financing		-3445	4022	5184	-885	-574	-413	-432	759	1329	1329	1329	1329	1329	1329	2280
Net benefit after financing			4338	4290	-364	-1027	-866	-1471	-281	289	289	289	289	1329	1329	2280
Accumulative balance			4338	8647	8283	7256	6390	4918	4637	4926	5215	5504	5792	7121	8449	10729
NPV before financing	\$5,456															
IRR before financing	87%															
<b>Farm model 2</b>																
Net benefit before financing		-5991	5978	6043	-1695	-1073	-752	215	1592	2732	2712	2732	2732	2732	2732	4560
Net benefit after financing			5876	5093	-619	-1861	-1540	-1575	-218	922	922	922	922	2732	2732	4560
Accumulative balance			5876	10969	10350	8489	6949	5374	5156	6078	7000	7922	8844	11576	14308	18868
NPV before financing	\$7,770															
IRR before financing	55%															
<b>Farm model 3</b>																
Net benefit before financing		-4665	6459	11387	4051	-2507	-611	-272	5324	7502	8792	8801	8801	8801	8801	12930
Net benefit after financing			10011	10594	4234	-1594	-2182	-4200	509	2687	3977	3986	5411	7230	8801	12930
Accumulative balance			14246	24840	29074	27480	25298	21098	21607	24294	28271	32257	37668	44898	53699	66629
NPV before financing	\$27,254															
IRR before financing	69%															
<b>Farm model 4</b>																
Net benefit before financing		-8126	2830	5173	4735	-2415	-1368	907	10685	15411	18583	19522	19522	19522	19522	28480
Net benefit after financing			6931	10913	11782	12524	-851	-1568	2987	6246	9418	10357	12870	14441	16922	28480
Accumulative balance			17844	29626	42150	41300	39732	37282	40269	46515	55933	66290	79160	93601	110524	139004
NPV before financing	\$49,302															
IRR before financing	58%															
<b>Farm model 5</b>																
Net benefit before financing		-11275	-3064	8006	16917	48886	-2738	4885	19916	29796	35457	37176	37176	37176	37176	55340
Net benefit after financing			8389	21749	33216	42724	2068	-1447	3866	11362	17023	18742	22116	27080	32953	55340
Accumulative balance			8389	30138	63354	106078	108146	106595	107014	118376	135399	154141	176257	203336	236289	291629
NPV before financing	\$111,865															
IRR before financing	69%															

**Table 6.6: Sensitivity farm financial analysis to lower yields and farm gate prices and higher costs.**

Scenario	Model 1	Model 2	Model 3	Model 4	Model 5
<b>Base solution</b>					
NPV (12%) US\$	5456	7770	27254	49302	111865
IRR	87	55	69	58	69
<b>Yield = 80%</b>					
NPV (12%) US\$	2487	2916	14027	25155	60832
IRR	45%	25%	38%	32%	40%
<b>Price = 80%</b>					
NPV (12%) US\$	2487	2916	14027	25155	60832
IRR	45%	25%	38%	32%	40%
<b>Costs = 120%</b>					
NPV (12%) US\$	3939	4844	20307	36098	84714
IRR	59%	32%	46%	38%	47%
<b>Yield = 80%; Costs = 120%</b>					
NPV (12%) US\$	970	(9)	7080	11950	33681
IRR	22%	12%	22%	20%	24%
<b>Yield = 80%; Price = 80%</b>					
NPV (12%) US\$	111	(967)	3445	5837	20006
IRR	13%	8%	17%	16%	21%
<b>Yield = 80%; Price = 80%; Cost = 120%</b>					
NPV (12%) US\$	(1406)	(3892)	(3502)	7368	7145
IRR	1%	-1%	7%	7%	10%

Alternatively, if both yields were to decrease by 20% while production costs were to simultaneously increase by 20%, the net present value for the 2 acre farm will be negative. The rate of return would be 12%. Rates of return for the other farm of between 20% and 24% may be expected. The expected NPV for these farms, if such an event were to occur can be observed in Table 6.5.

If on the other hand, both yields and farm gate prices were to decrease by 20%, the effect will be somewhat similar to the results from the previous scenario investigated.

The final case investigated was the possibility of yields and farm gate price decreasing by 20% while production cost increases by 20%. Under this scenario, negative net present values would result for the 1 acre, 2 acre and 5 acre farm models. For all the farm models, the internal rates of return would range between -1 per cent to 10 per cent. These rates are less than the 12 per cent discount rates assumed in the analyses.

The sensitive nature of the IRR to downside sensitivities is hardly surprising, given the fact that there is a high ratio of variable to capital cost of producing fruits based on the farm models. The results of the above sensitivity analyses underscores the importance of fruit producers following the recommended technologies so that optimum fruit yields will be achieved. This is especially important since they would have a lesser degree of control on farm-gate prices. The results also suggest that every effort should be made by the farmers, particularly in their use of labour so as to limit increases in their costs of production.

### Viability at the marketing level

A summary of the financial viability of the Marketing and National Import Board participating in the project is presented in Table 6.6. The full analyses can be observed in Table A3.24.

According to the results, a very high rate of return of 477% may be expected. The net present value over the duration of the project would be just over 6 million dollars. The net crop marketing returns are also presented. For all crops except sapodilla, positive net returns can be expected. With respect to avocado, at current prices and costs, after full production has been attained, a net loss to the MNIB for its involvement of \$US18,000 could be expected.

On the assumption that the FOB price which the MNIB receives is reduced by 20%, the NPV to the Marketing Board would fall from US\$5.4 million to around US\$2.2 million. That is, the NPV would fall by more than 50%. The internal rate of return would be reduced to 316%. Under such a scenario, the MNIB would incur losses with hot pepper, avocado and sapodilla.

Alternatively, if the FOB price which the MNIB receives is decreased by 20% while it only obtained 50% of the volume of the output of the project, its net present value of earnings over the period would be just over one million dollars. The internal rate of return would be 186% (See Table 6.6). If the price of cartons used by the MNIB were to decrease by 20%, while the FOB price it receives simultaneously decreased by 20% and its share of project output was 50%, the net present value of its earnings discounted at 12% would be US\$1.4 million.

The internal rate of return would be 199%. Despite the fact that a high rate of return would be earned for its participation in the project, it would again incur losses on avocado, sapodilla and hot pepper.

The marketing cost per pound of fruits, the percentage of packaging material relative to MNIB cost, the percentage of packaging material relative to the FOB price received for produce and the MNIB cost relative to the FOB price received are presented in Table 6.7.

As can be observed, the cost of packaging material relative to total MNIB cost range between 15 per cent for sorrel to 37 per cent for mango. MNIB marketing cost relative to the FOB price received ranges between 57 per cent for breadfruit to over 117 per cent for sapodilla.

**Table 6.6: Summary of results of the financial viability of the participation of the MNIB in the Project**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Base solution</b>																
Net MNIB revenue	-130200	428550	1508400	1753319	1407726	365096	171665	347324	475002	597323	637763	658009	658009	658009	658009	658009
NPV (12%)	\$5,425,083															
IRR	477%															
<b>NET CROP MARKETING RETURNS</b>																
Avocado				-122	-653	-1964	-4050	-7506	-13275	-16830	-18810	-18810	-18810	-18810	-18810	-18810
Mango				5729	34120	119041	266080	384707	489343	526813	541339	541339	541339	541339	541339	541339
Soursop				8580	25740	55770	81510	97240	111540	120120	125840	125840	125840	125840	125840	125840
Sapodilla				-2720	-10880	-16320	-24480	-32640	-32640	-32640	-32640	-32640	-32640	-32640	-32640	-32640
Breadfruit				3624	18120	22650	37750	42280	42280	42280	42280	42280	42280	42280	42280	42280
Papaya				117120	336720	387960	117120									
Passion fruit				61200	144000	158400	104400									
Hot pepper				60150	481200	577440	348870									
Sorrel																
FOB price = 80%																
Net MNIB revenue	-130200	238150	937200	1101936	914275	237252	-6537	-10896	-37223	-50877	-72487	-69341	-69341	-69341	-69341	-69341
NPV (12%)	\$2,184,122															
IRR	316%															
<b>NET CROP MARKETING COST</b>																
Avocado				-864	-4640	-13968	-28800	-53376	-94400	-119680	-133760	-133760	-133760	-133760	-133760	-133760
Mango				5569	26230	30210	36040	41340	44520	46640	46640	46640	46640	46640	46640	46640
Soursop				3180	9540	20670	30210	36040	41340	44520	46640	46640	46640	46640	46640	46640
Sapodilla				-5920	-23680	-35520	-53280	-71040	-71040	-71040	-71040	-71040	-71040	-71040	-71040	-71040
Breadfruit				1944	9720	12150	20250	22680	22680	22680	22680	22680	22680	22680	22680	22680
Pawpaw				53120	152720	175960	162680	53120								
Passion fruit				-49300	-116000	-127600	-84100									
Hot pepper				44250	354000	424800	256650									
Sorrel																

Table 6.6: continued

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
FOB price = 80%, MNIB share of output = 50% Net MNIB revenue -130200 119075 468600 550968 457137 118626 -3268 -5448 -18611 -25438 -36244 -34671 -34671 -34671 -34671 -34671																
NPV (12%) \$1,026,961 IRR 186%																
<b>NET CROP MARKETING COST</b>																
Avocado				-432	-2320	-6984	-14400	-26688	-47200	-59840	-66880	-66880	-66880	-66880	-66880	-66880
Mango				-808	-808	-760	2785	13115	22254	30247	32556	33069	33069	33069	33069	33069
Soursop				1590	1590	4770	10335	15105	18020	20670	22260	23320	23320	23320	23320	23320
Sapodilla							-2960	-11840	-17760	-26640	-35520	-35520	-35520	-35520	-35520	-35520
Breadfruit							972	4860	6075	10125	11340	11340	11340	11340	11340	11340
Pawpaw	26560	26560	76360	87980	81340	26560										
Passion fruit																
Hot pepper	-24650	-58000	-63800	-42050	-42050											
Sorrel	22125	177000	212400	128325												
FOB price = 80%, Carton cost = 80%, MNIB share of output = 50% Net MNIB revenue -130200 132765 507080 594284 486780 126102 19455 43242 52685 65725 63902 67695 67695 67695 67695 67695																
NPV (12%) \$1,370,033 IRR 199%																
<b>NET CROP MARKETING COST</b>																
Avocado				-332	-1784	-5369	-11070	-20516	-36285	-46002	-51414	-51414	-51414	-51414	-51414	-51414
Mango				400	400	5101	21444	52557	78198	100769	108480	111213	111213	111213	111213	111213
Soursop				1590	1590	4770	10335	15105	18020	20670	22260	23320	23320	23320	23320	23320
Sapodilla							-2368	-9472	-14208	-21312	-28416	-28416	-28416	-28416	-28416	-28416
Breadfruit							1114	5568	6960	11600	12992	12992	12992	12992	12992	12992
Pawpaw	26560	26560	76360	87980	81340	26560										
Passion fruit																
Hot pepper	-12070	-28400	-31240	-20590	-20590											
Sorrel	23235	185880	223056	134763												

The internal rate of return would be 199%. Despite the fact that a high rate of return would be earned for its participation in the project, it would again incur losses on avocado, sapodilla and hot pepper.

The marketing cost per pound of fruits, the percentage of packaging material relative to MNIB cost, the percentage of packaging material relative to the FOB price received for produce and the MNIB cost relative to the FOB price received are presented in Table 6.7.

As can be observed, the cost of packaging material relative to total MNIB cost ranges between 15 per cent for sorrel to 37 per cent for mango. MNIB marketing cost relative to the FOB price received range between 57 per cent for breadfruit to over 117 per cent for sapodilla.

These results suggest that every effort should be made by the MNIB to reduce its per unit cost of marketing the output from the project. Otherwise, it could experience significant revenue losses especially if the FOB prices received were to fall.

**Table 6.7: MNIB marketing costs relative to the price of packaging material and FOB prices**

<b>Crop</b>	<b>1</b> US\$	<b>2</b> %	<b>3</b> %	<b>4</b> %
<b>Avocado</b>	0.568	26	27	103
<b>Mango</b>	0.398	37	33	88
<b>Soursop</b>	0.307	22	15	68
<b>Sapodilla</b>	0.468	32	33	117
<b>Breadfruit</b>	0.199	30	17	57
<b>Pawpaw</b>	0.317	21	13	63
<b>Hotpepper</b>	0.578	26	23	89
<b>Sorrel</b>	0.998	15	14	94

Column 1 is the MNIB cost per pound including purchase price from farmers, column 2 is the cost of packaging material relative to the total MNIB cost; column 3 is the cost of packaging material relative to the average FOB price received. column 4 is the MNIB cost as a percentage of the average FOB price received.

### Viability of the credit institution level

In order for the GDB to participate in the project, a spread of 6% on funds received would be necessary. This is based on their costs of on farm lending. To be able to lend to farmers at 10%, the GDB must receive funds at no greater than 4%. A grace period of at least six years and a repayment over at least seven years would be necessary on those funds to be able to accommodate the terms specified for on-lending to fruit producers.

### Financial viability of implementing the project

Despite the fact that it may be financially viable for fruit producers and exporters to participate in the project, if sufficient funds are not available, its implementation will be hindered.

The financial viability of implementing the project is presented in Table 6.8.

The total investment cost would amount to US\$0.333 million. For the annual operating cost of implementing the project, US\$1.935 million would be required. The total investment and annual implementation cost would therefore total US\$2.269 million.

External funds would be required for meeting the investment costs to be incurred by the project. The annual implementation cost is expected to be met by both external and local resources. During the first six years of implementation, the incremental operation cost is to be met from external resources. From years 7 through to year 16, local resources will be used.

Additionally, US\$3.138 million of external resources will be required for the credit component. The total amount of external resources required for the successful implementation of the project would be US\$4,580,720.

#### Financial viability of the overall project

The overall project is financially viable. For all resources utilized in the production and marketing of fruits, the net present value discounted at 12 per cent is US\$676,041 million. The internal rate of return is 16%. See Table A3.25.

The total cost of all activities involved in the implementation of the project, including the costs of production at the farm level would amount to just over US\$25 million. Total benefits of just over US\$40 million is expected to result (see Table 6.8)

**Table 6.8: Costs and returns from implementing the project**

Items	Amount
<b>PROJECT COST</b>	
Investment	333453
Project operating cost	1935150
Production costs	8936621
Marketing costs	12710480
Loan administration cost	1189397
<b>TOTAL PROJECT COSTS</b>	<b>25105101</b>
<b>PROJECT BENEFITS</b>	
Export of fruits	40390624
Sale of plants	321040
<b>TOTAL PROJECT BENEFITS</b>	<b>40711664</b>



The proposed sources and uses of funds for the implementation of the project (excluding the credit programme) is presented in Table 6.9. Of a total of US\$2,268,603 required for investment and annual operating costs, US\$1,442,778 is to be obtained from external sources while the rest (US\$825,825) is to be obtained from local sources. In addition however, US\$3,137,944 is required for the credit programme. These resources are expected to be obtained from external sources. The total amount of external resources required for the implementation of the project is therefore US\$4,580,720.

### Economic viability of the project

Economic analyses were conducted on the overall project by converting financial prices to economic prices. A conversion factor of 0.8 was used to correct financial labour costs to economic costs. The financial costs of transport and plants produced at the propagation station were converted to economic values by use of a standard conversion factor of 0.858. This was necessary because individual conversion factors were not available. Material inputs used on the farm were converted to economic values by use of a conversion factor of 0.95.

**Table 6.9: Project implementation funds flow analysis**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Years 10-16
<b>Investment costs</b>										
Propagation station	162375									
MNIB	130200									
PFU	25000									
Contingencies	15879									
<b>Total investment</b>	<b>333453</b>									
<b>Project implementation costs</b>										
<b>Personnel costs</b>										
Project manager	20000	20000	20000	20000	20000	20000	18000	18000	18000	18000
Field agronomists	40000	40000	40000	40000	40000	40000	13300	13300	13300	13300
Post harvest specialist	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000
Administrative secretary	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
Propagation support staff	30000	30000	30000	30000	30000					
Driver	5000	5000	5000	5000	5000	5000				
<b>Supplies</b>										
Propagation supplies	16500	39500	27800	19200	10000					
General office supplies	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Vehicle maintenance insurance	6000	6000	6000	6000	6000					
Training	6000	10000	6000	6000	6000	6000				
Communication	1500	1500	1500	1500	1500	1500	1500	500	500	500
Product promotion	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750
Travel and per diem	2000	2000	2000	2000	2000	2000				
Monitoring and evaluation	2000	2000	2000	2000	2000	8000				
Consultant		20000								
Contingencies (5%)	8738	11088	9303	8873	8413	6413	3928	3878	3878	3878
<b>Total operating costs</b>	<b>183488</b>	<b>232838</b>	<b>195353</b>	<b>186323</b>	<b>176663</b>	<b>134663</b>	<b>82478</b>	<b>81428</b>	<b>81428</b>	<b>81428</b>
<b>Total outflow</b>	<b>516941</b>	<b>232838</b>	<b>195353</b>	<b>186323</b>	<b>176663</b>	<b>134663</b>	<b>82478</b>	<b>81428</b>	<b>81428</b>	<b>81428</b>
<b>Inflows for project implementation</b>										
Grant/loan receipts	516941	232838	195353	186323	176663	134663				
Local contribution*							82478	81428	81428	81428
<b>Total loan/grant</b>	<b>1442778</b>									
<b>Total local contribution</b>	<b>825825</b>									

\*An additional US\$10000 will be required in year 15 for a full evaluation of the project making the local contribution in year 15 US\$91428

**Table 6.10: Uses and sources of funds for overall project implementation (constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Years 10-16
Credit	391889	679042	470115	534569	436749	304631	218112	102837		
Total credit	3137944									
Investments	333453									
Operating costs	183488	232838	195353	186323	176663	134663	82478	81428	81428	81428
TOTAL	908830	911879	665467	720891	613411	439293	300589	184264	81428	81428
	5406545									
External resources	908830	911879	665467	720891	613411	439293	218112	102837		
Local Resources*							82478	81428	81428	81428
External resources required	4580720									
Total local contribution	825825									

\*An additional US\$10000 will be required in year 15 for a full evaluation of the project making the local contribution in year 15 US\$91428

The project was subjected to a number of downward sensitivities as presented in Table 6.11. The first scenario investigated was a reduction in farm production by 20%. Under the scenario, the net present value of the project would be US\$(19,319) while the economic rate of return would be 12%. Alternatively, if farmers participation was only 50%, the economic net present value to all resources utilized will be US\$(54,809). The economic rate of return would be 11%.

The third scenario investigated was the possibility that the FOB prices received for fruits exported were to decrease by 20%. If this was to happen, the economic net present value would be US\$(161,289) while the economic rate of return would be 11%.

A fourth scenario investigated was the possibility that both the FOB price received and yields were to simultaneously decrease by 20%. Under this scenario, the project would yield only 1% to the resources utilized. If however, under a similar scenario the price of cartons used by the MNIB were to decrease by 20%, the rate of return which the project would yield would increase to 7%.

### Other benefits of the project

At full development there is expected to be other benefits which would include additional foreign exchange to the country, increased farm incomes and increases in the standard of living of the participating farmers and increased employment. Additionally, because the established fruit trees would continue to be productive beyond the period analyzed, the benefits of the project are expected to be even greater than indicated by the analysis.

**Table 6.11: Summary of economic analysis of the project**

PROJECT SIMULATION	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Base solution																
Net Project Benefits	-497854	-335197	-34284	-69796	-306098	-468932	-149916	151607	691513	1093516	1257234	1323620	1348327	1366277	1360932	1372797
Accumulative Benefits	-497854	-833051	-867335	-937130	-1243228	-1712160	-1862076	-1710469	-1018956	74560	1331794	2655514	4003741	5370018	6730950	8103747
NPV	\$1,305,269															
IRR	20%															
Yield = 80%																
Net Project Benefits	-497854	-378031	-180108	-237657	-427070	-508240	-241387	-38172	411952	740562	873741	931098	955805	973755	968410	980276
Accumulative Benefits	-497854	-875885	-1055993	-1293650	-1720720	-2228960	-2470347	-2508519	-2096567	-1356005	-482264	448835	1404639	2378394	3346805	4327080
NPV	(\$19,319)															
IRR	12%															
Participation = 50%																
Net Project Benefits	-497854	-278672	-109780	-123246	-236809	-301086	-116010	35164	305117	506119	587978	621171	633524	642499	634577	645759
Accumulative Benefits	-497854	-776526	-886305	-1009552	-1246361	-1547447	-1663457	-1628293	-1323175	-817056	-229079	392092	1025616	1668115	2302692	2948452
NPV	(\$54,809)															
IRR	11%															
FOB = 80%																
Net Project Benefits	-497854	-335197	-34284	-70538	-317430	-516575	-288138	-134113	270188	561816	680584	733470	758177	776127	770782	782647
Accumulative Benefits	-497854	-833051	-867335	-937873	-1255302	-1771878	-2060016	-2194129	-1923941	-1362124	-681541	51929	810106	1586233	2357015	3139662
NPV	(\$161,289)															
IRR	11%															
FOB = 80; Yield = 80																
Net Project Benefits	-497854	-378031	-180108	-238251	-436135	-546355	-351965	-266748	74892	315202	412421	458978	483685	501635	496290	508156
Accumulative Benefits	-497854	-875885	-1055993	-1294244	-1730379	-2276734	-2628699	-2895447	-2820555	-2505553	-2092932	-1633953	-1150268	-648633	-152343	355812
NPV	(\$1,192,566)															
IRR	1%															
FOB = 80%, Yield = 80%; Box = 80%																
Net Project Benefits	-497854	-356127	-118540	-168946	-388708	-534393	-315608	-188844	188966	461063	572655	622764	647471	665421	660076	671941
Accumulative Benefits	-497854	-853981	-972521	-1141466	-1530174	-2064568	-2380175	-2569020	-2380054	-1918991	-1346336	-723573	-76102	589319	1249394	1921336
NPV	(\$643,650)															
IRR	7%															

A summary of the economic returns to the project is presented in Table 6.10. Full details of the analysis can be observed in Table A3.26. The economic net present value of all resources used by the project amounted to US\$1.305 million. The economic rate of return was 20%.

## **7 ASSUMPTIONS, RISKS AND FLEXIBILITY**

### Assumptions

The project is analyzed on the following assumptions:

- the life of the project is 16 years;
- lands are available for fruit production;
- all farm labour is costed at ongoing wage rate of US\$11.11 per day;
- all the orchards are planted by the fifth year of the project;
- the orchards are inter-cropped with papaya, sorrel and hot pepper;
- continued government support is maintained;
- all costs and prices are expressed in constant terms, that is, price increases due to inflation are excluded;
- no major changes in the inflation rate nor the exchange rate occur during the implementation;
- farmers are willing to take risks and are interested in producing fruits;
- the political environment remains stable and continued government and private sector support is received;
- there is no introduction of new pests in the region nor significant changes in environmental factors to cause non-pest organisms to reach pest status;
- external resources will be obtained and the GDB can lend to farmers at 10 per cent;
- the present trend in market demand for fruits and prices would remain;

- Grenada would continue to maintain its fruit fly free status and thus be able to export fruits to the USA; and
- there are no natural disasters such as hurricanes during the life of the project.

### Risks

Sensitivity of the rate of return, net present value and the project's cash flow to the variation of several of the basic assumptions made in the project were tested. Among the factors tested were failures to achieve the anticipated acreages and yields per acre, a higher cost of labour and lower prices of the output. The results were presented in Table 6.4.

Sensitivity analyses of the estimated NPV and IRR were conducted both at the overall project level and at the farm level. Among the changes investigated are:

- decrease in price of output by 20 per cent;
- decrease in crop yields by 2 per cent;
- increase in the cost of material inputs by 20 percent;
- increase in labour costs by 20 percent;
- changes in output prices, yields, material input prices and labour costs.

These simulations suggest that the simultaneous fall of yields and output price by 20% would cause Farm Model 2 to be financially non-viable. The occurrence of all three downside events (20 % lower yields, 20% lower output prices and 20 % higher costs) would result in all five farm models yielding lower than 12% rate of return. This suggests the need to ensure that the recommended production practices are followed to ensure optimum yields.

### Flexibility

A fair degree of flexibility will be allowed during project implementation. The ongoing monitoring and evaluation will allow necessary adjustments to be incorporated in the project in response to changing conditions. Flexibility will also be allowed in terms of the number of years in which intercropping will be planted. Furthermore, there will be some degree of flexibility in terms of the intercropping which will be used. Although the project has been analyzed with papaya, sorrel and hot pepper, as implementation proceeds, other intercroppings which are financially viable to produce will be considered during implementation.

## **8 MONITORING AND EVALUATION**

### **8.1 Definition of Indicators**

In order to facilitate the monitoring and evaluation of the project, data will be collected for indicators at the overall objective, specific objective, intermediate result and the activity level of the project.

As an example, indicators at the intermediate results level would include:

- annual number of plants propagated;
- volume of exports of fruits by type and grades;
- number of training sessions conducted, the topics covered and the number of participants;
- number of farmers utilizing credit;
- loan repayment and default rate;
- amount of post harvest losses of fruits;
- number of farmers utilizing the improved technological packages;
- per acre yields of fruits;
- per acre cost of production;
- acreages of fruits established;
- pest and disease infestation and damage to fruit trees and fruits.

Indicators to monitor the achievement of the project specific objectives include:

- development of and adherence of staffing plans;
- equipment procured, installed and in operation;
- preparation of an adherence to an annual work plan;
- technical knowledge of the farmers as indicated by technology usages;

- number of training sessions successfully completed for project staff, farmers and exporters and the number of participants;
- number of farmers growing fruits and adopting the new practices; and
- acres of fruit trees established and yields per acre.

To verify achievement of the overall project objective, data would be collected for a number of indicators. They include:

- share of fruit exports in total agricultural exports;
- number of farmers producing fruits;
- number of persons at various levels in the fruit sub-sector; and
- foreign exchange earned from fruit exports.

## **8.2 Data collection for project monitoring**

The data required for verification of the indicators of project success would be obtained from reports of the project implementation team. As the information system becomes operational and begins to produce data, project management would ensure that quarterly reports are completed in a timely and understandable manner and distributed so that timely modifications and improvements of projects can be made.

These would be supplemented by rapid low cost surveys. To conduct the surveys and analyze the data, temporary staff will be hired.

## **8.3 Reviews/evaluations**

The data gathered and analyzed in relation to project objectives, intermediate results and project activities would provide an empirical basis for evaluations. Midway through the project, there would be an evaluation. The purpose of this evaluation would be to determine the extent of progress achieved and whether the project is on target as proposed. This would provide the basis for any adjustments which may be required.

Just before its termination, there would be a full evaluation to determine whether the project has achieved the expected impact on fruit production. In addition, this evaluation would provide guidelines as to future activities which should be considered for the continued development of the fruit sub-sector in Grenada. These evaluations will be conducted by the planning unit of the Ministry of Agriculture in collaboration with IICA.

## **9 CONCLUSIONS AND PROPOSALS**

The feasibility study conducted suggests that the proposed fruit project could contribute directly towards the achievement of the objectives for the agricultural sector. It further indicates that the fruit sub-sector could be viably developed. The proposed institutional strengthening of the Ministry of Agriculture and the Marketing and National Import Board would enhance capabilities to successfully implement the project.

The simulation analysis however has indicated that if yields and farm gate prices were to be reduced while production costs increased, the financial attractiveness of the project would be substantially reduced. This is hardly surprising. It is normally the case for projects with high variable costs relative to investment costs. The sensitivity of the financial attractiveness of the project to farmers suggests that every effort should therefore be made during project implementation to ensure that the participating farmers adopt the recommended practices so that high yields may be obtained.

The cost of packaging material used by the MNIB comprises a substantial share of their total costs. As indicated by the simulation, if FOB prices were to be reduced, the MNIB stands to incur losses on avocado, hot pepper and sapodilla in particular. This is due to the high MNIB costs relative to the FOB prices received. Every effort should be made by the MNIB to obtain cheaper supplies of packaging material and increasing their overall operation efficiencies. With these measures, the project could be successfully implemented.

As with the Farm Models, the overall economic attractiveness of the project is lessened substantially if yields are reduced and FOB prices decreased. However, the fact that the fruit orchards would continue to produce benefits beyond the sixteen years analysed would enhance its economic viability.

Additionally, the potential for agro-processing increases the economic attractiveness of the project. Furthermore, the fact that the yield levels used were quite conservative would suggest that reasonable possibilities exist for obtaining at least those yields. The project should be implemented.



# ***ANNEXES***



# **ANNEX 1**

## Market prospects

The performance in the EC market of a few of the fruits which the project is to produce is briefly analyzed below:

### Mango

Mango imports into the EC as a whole and the main importing countries are presented in Table 6.3. In the period 1980 to 1992, total imports increased from 8910 metric tons to over 39,000 tons by 1991 (see Table A1.1). This is equivalent to an overall increase of over 337 per cent.

Table A1.1: Mango imports into the EC, 1980 to 1992, metric tons

Country	1980	1985	1986	1987	1988	1989	1990	1991	1992
EC Total	8910	17160	24247	28011	27,361	30,222	31,602	39,516	
Germany	968	1745	3083	4227	4834	5507	6358	8456	9101
France	2281	5044	6171	6330	7171	8889	8252	9324	9900
Netherlands						7001	7537	8401	11180
UK	3293	6463	8831	9622	10141	10929	10440	13756	12805

SOURCE: Import trends: Fresh fruit and Vegetables in EC and the Netherlands. Parts 1 and 2.

The largest importer is the United Kingdom which imported approximately one third of total EC imports. Other countries with significant imports are Germany, France and the Netherlands. In all these countries, significant increases in imports occurred.

Mango imports into the EC are supplied by about 25 countries. The largest exporters are Puerto Rico, Brazil, Venezuela and Mexico which together account for 46 per cent of total imports. Israel, Mali, South Africa and Costa Rica accounted for a further 22 per cent. The major suppliers to the UK market are the USA (21%), Venezuela (21%), Pakistan (18%) and India (8%). The Netherlands market is supplied mainly by the USA, Brazil and Peru. The French demand is met mainly with imports from Mexico, Brazil, Burkina Faso and South Africa. Germany is supplied by the Netherlands and Costa Rica.

Mango supplies in the market are greatest in the months of April to July when a large number of countries are exporting (Figure A1.1). Generally, mango supplies between October and March are lower than in the other months (see Table A1.2).

Wholesale prices in the UK at New convent Gardens ranged from US\$2.14 per kilogram to US\$4.75. Prices tend to peak between October and November.

**Figure A1.1: Mango availability in the UK 1993**

Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Brazil												
Peru												
Ecuador												
Venezuela												
Colombia												
Costa Rica												
Mexico												
Guatemala												
Honduras												
Puerto Rico												
Jamaica												
St. Lucia												
Grenada												
South Africa												
Ghana												
Mali												
Sudan												
Kenya												
Pakistan												
India												

SOURCE: Organisation of Eastern Caribbean States Agriculture Diversification Co-ordination unit.

### Avocado

Total avocado imports into the EC in 1991 was 90, 435 tons (Table A1.3). South Africa has the largest market share in the EC with 28 per cent in 1990. Other major exporters include Israel (18%), Spain (16%), France and Mexico (10% each).

The major exporter in October, November and December and January to March was Israel, with between 70 and 85 per cent of total supplies in those months. Between April to August, the major supplies came from South Africa (between 3443 and 5241 tons). Of the total EC imports for that year, Israel alone supplied 46 per cent while South Africa 32 percent.

**Table A1.2: EC monthly mango imports in 1991 (tons)**

Months	Mangoes
January	2105
February	1576
March	2339
April	4796
May	4450
June	4873
July	5462
August	3284
September	3098
October	2943
November	2079
December	2511
TOTAL	39516

SOURCE: Import trends: Fresh fruit and Vegetables in EC and the Netherlands, Parts 1 and 2.

**Table A1.3: Avocado imports into the EC, 1980 - 1992 metric tons**

	1980	1985	1986	1987	1988	1989	1990	1991	1992
EC Total	35507	86698	99223	115654	81428	94644	113669	90435	
Germany	1612	5594	7880	9713	5956	6704	8435	9410	10021
France	24032	59432	66721	75539	51561	58588	68068	75842	74375
Netherlands	1277	2797	3633	4064	3864	4912	5267	6139	5924
UK	6563	13947	14869	18742	13010	14400	14225	15660	15991

SOURCE: Import trends: Fresh fruit and Vegetables in EC and the Netherlands, Parts 1 and 2.

**Table A1.3: EC monthly avocado imports in 1991 (tons)**

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<b>Months</b>	<b>Avocado</b>
January	6080
February	6340
March	5915
April	7828
May	7892
June	6306
July	6364
August	7333
September	6044
October	10100
November	10306
December	9927
<b>TOTAL</b>	<b>90435</b>

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SOURCE: Import trends: Fresh fruit and Vegetables in EC and the Netherlands, Parts 1 and 2.

Analysis of New Convent Garden wholesale prices for avocado revealed that in 1990, prices ranged from US\$0.89 to US\$3.35 per kilogram. Prices tend to peak during the period late July to the beginning of September. Higher prices were observed in January and May. The period of lowest prices is September to December.

### Papaya

In 1991, total imports of papaya into the EC amounted to just under 7000 tons (Table A1.4). The largest importer being the United Kingdom with around 27 per cent of the total. The other major importers were Germany and the Netherlands with 25 and 23 per cent respectively.

In 1990, the largest exporter to the EC was Brazil with 3400 metric tons followed by Costa Rica with 1400 metric tons. During that year, Jamaica supplied 400 metric tons.

Among the EC importing countries, the major supplier to Germany is Costa Rica, The Netherlands and Brazil. France is supplied mainly by Brazil while the Netherlands obtains its supplies mainly from Brazil, Costa Rica and Malaysia. The United Kingdom is supplied mainly by Brazil and Jamaica.

The market preference is for the solo variety which is relatively small with a fruit weight of 300 to 400 grams.

**Table A1.4: Papaya imports into the EC, 1980 - 1992 metric tons**

	1980	1985	1986	1987	1988	1989	1990	1991	1992
EC Total	614	2205	3211	5074	6,003	5,164	5,976	6,711	
Germany	138	588	876	1362	1780	1752	2109	2421	2701
France	139	319	461	541	752	942	841	858	995
Netherlands						907	1121	1564	1674
UK	95	565	681	1029	1363	1557	1654	1920	1901

SOURCE: Import trends: Fresh fruit and Vegetables in EC and the Netherlands, Parts 1 and 2.

Imports are distributed fairly evenly throughout the year (Table A1.5).

**Table A1.5: EC monthly papaya imports in 1991 (tons)**

Months	Papaya
January	480
February	414
March	500
April	693
May	641
June	555
July	585
August	528
September	524
October	560
November	536
December	695
TOTAL	6711

SOURCE: Import trends: Fresh fruit and Vegetables in EC and the Netherlands, Parts 1 and 2.

The EC represents a market for a substantial amount of fruits from Grenada. The volume of non-traditional agricultural export from the Caribbean has grown considerably over the last decade. Further growth has been constrained by supplies since the stock of trees has not increased.



**Table A1.6: MNIB exports of fruits to EC, 1988 to 1991 (tons).**

	1988	1989	1990	1991	1992
Mango	50	87	162	173	
Other	92	139	212	207	208

SOURCE: MNIB, Grenada.

The projected output of avocado, mango and papaya as a percentage of EC and UK imports is presented in Table A1.7. At full production, the output of mango is expected to be around 6 per cent of total EC 1991 mango imports and 17 per cent of UK imports. The volume of avocado expected to be produced by the project at full production is expected to be less than one half of one per cent of avocado imports into the EC and 3 per cent into the UK in 1991.

The estimated output of papaya to be produced by the project is expected to rise by the fourth year to around 14 per cent of 1991 levels of import into the EC. Thereafter, it decreases as the papaya intercrops are removed from the orchards.

**Table A1.7: Projected fruit output as a percentage of 1993 EC and UK total imports**

	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12-16
Mango (tons)	0.0	0.0	0.0	36.4	176.8	562.9	1189.7	1687.5	2127.2	2290.2	2357.1
% EC imports	0.0	0.0	0.0	0.1	0.4	1.4	3.0	4.3	5.4	5.8	6.0
% UK imports	0.0	0.0	0.0	0.3	1.3	4.1	8.6	12.3	15.5	16.6	17.1
Avocado (tons)	0.0	0.0	3.0	16.2	48.7	100.4	186.2	329.2	417.4	466.5	466.5
% EC imports	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.4	0.4
% UK imports	0.0	0.0	0.0	0.1	0.3	0.6	1.2	2.1	2.7	3.0	3.0
Papaya (tons)	285.7	821.4	946.4	875.0	285.7	0.0	0.0	0.0	0.0	0.0	0.0
% EC imports	4.3	12.2	14.1	13.0	4.2	0.7	0.0	0.0	0.0	0.0	0.0
% UK imports	14.9	42.8	49.3	45.6	14.9	0.0	0.0	0.0	0.0	0.0	0.0

## Prices

Since the crops are expected to be sold in international markets, prices used in the analyses are based on present levels and historic trends. All are expressed in terms of constant currency.

**Table A1.8: Prices of various products, US\$/lb, 1992**

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<b>Product</b>	<b>Farm price</b>	<b>FOB price</b>	<b>Wholesale price London</b>
Avocado		0.36	0.55
Breadfruit	0.08	0.35	0.85
Mango-Julie	0.19	0.45	0.95
Papaya	0.19	0.50	
Sour Sop	0.18	0.45	0.78
Sapodilla	0.26	0.40	
Hot pepper	0.37	0.65	
Sorrel	0.74	1.06	

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**SOURCE: National and Marketing Import Board, Grenada**

Despite the fact that there seems to be adequate demand for the output of the project in the EC and UK market, a feasibility study into the potential for agro-processing of the project's output to increase value-added should be conducted to complement this fruit production project.

## **ANNEX 2**

# **JOB DESCRIPTION - PROJECT MANAGER**

## **1. IDENTIFICATION**

- (a) Position/Title: Project Manager, Project Implementation Unit (PIU)
- (b) Immediate Supervisor: Chairman, Project Coordinating Committee (PCC)

## **2. GENERAL ACCOUNTABILITY**

The Project Manger (PM) is responsible for the successful implementation of the project. This will involve periodic review of project performance and identification of the need for changes in implementation strategies as necessary.

## **3. NATURE AND SCOPE**

The Job requires attention to the policies and operations of the agencies whose work will affect project performance. The incumbent will need to identify and bring to the attention of the Chairman of the PCC, actions of other agencies which are likely to adversely affect project performance.

## **4. SPECIFIC ACCOUNTABILITY**

In order to achieve the general accountabilities set out above, the PM will:

- (a) Supervise a staff of four technicians and one administrative officer in the implementation of quarterly and annual work programs relevant to the implementation of the project;
- (b) Cooperate with other units/divisions within the Ministry of Agriculture (e.g.) Plant Protection and Plant Propagation whose work is critical to successful project performance;
- (c) Liaise with operating personnel in the national level institutions (Marketing and National Import Board (MNIB), Productive Farmers' Union (PFU), Grenada Development Bank (GDB) and regional and international institutions (Agricultural Diversification Coordinating Unit (ADCU), Caribbean Agricultural Research and Development Institute (CARDI) and The Inter-American Institute for Cooperation on Agriculture (IICA) to facilitate the timely delivery of technical assistance in support of project implementation;
- (d) Design and supervise the conduct of periodic surveys to determine the status of project implementation;

- (e) Prepare periodic project evaluation reports as required by the PCC and relevant funding agencies;**
- (f) Undertake any other activities necessary for the achievement of project objectives.**

# **JOB DESCRIPTION - FIELD OFFICER**

## **1. IDENTIFICATION**

- (a) Position/Title: Field Officer, PIU  
(b) Title of Immediate Supervisor: Project Manager, PIU

## **2. GENERAL ACCOUNTABILITY**

The Field Officer (FO) is responsible for the successful implementation of the production aspects of the project. This will involve the review of targets set and identification of the factors which are likely to constrain the achievement of project objectives and devising the means of removing same.

## **3. NATURE AND SCOPE**

The Job requires close contact with the farming community and farmer's organizations. The incumbent will require skill in the early detection of agronomic plant health and other problems affecting the commodities and a knowledge of solutions or the possible sources of such solutions.

## **4. SPECIFIC ACCOUNTABILITY**

In order to achieve the general accountabilities set out above, the FO will:

- (a) Design quarterly and annual work programs consistent with the overall expectations of the project;
- (b) Identify the farmers who will form the nucleus of the production of the selected commodities and assist them in their planning for the establishment of those commodities. This will include support to the farmers in the preparation of farm plans for securing credit;
- (c) Transfer technology and generally provide technical advice to farmers and farmers' organizations in the establishment, maintenance and harvesting of the commodities;
- (d) Work with specialists from the Ministry of Agriculture (MOA), Grenada Development Bank (GDB), Caribbean Agricultural Research and Development Institute (CARDI), The Inter-American Institute for Cooperation on Agriculture (IICA) and other agencies to ensure early detection of problems and the timely delivery of remedies to the technical problems affecting the farming community; and

- (e) **Conduct periodic surveys to inform the status of implementation of the project.**

# **JOB DESCRIPTION - ADMINISTRATIVE ASSISTANT/SECRETARY**

## **1. IDENTIFICATION**

- (a) Position/Title: Administrative Assistant/Secretary, PIU
- (b) Title of Immediate Supervisor: Project Manager, PIU

## **2. GENERAL ACCOUNTABILITY**

The Administrative Assistant/Secretary (AA/S) is responsible for the general administration of the office and the performance of secretarial duties. It is expected that two-thirds of the time will be spent on administrative functions and the remainder on secretarial duties.

## **3. NATURE AND SCOPE**

The Job requires communication not only with staff of the PIU, but with personnel from national, regional and international agencies concerned with the development of the project. The incumbent will be required to be familiar with the project and to deal intelligently with situations that may arise as the technical officers are likely to be spending much time in the field.

## **4. SPECIFIC ACCOUNTABILITY**

In order to achieve the general accountabilities outlined above, the AA/S will:

- (a) See to the proper functioning of the office. This would include the maintenance of inventory of supplies and making arrangements for repair, maintenance and replacement of assets;
- (b) Maintain data bases comprising of statistical information from surveys conducted by the technical officers;
- (c) Respond to requests for and supply information required by agencies involved in project implementation;
- (d) Arrange for meetings between technical staff and personnel in the agencies concerned with project implementation; and
- (e) Type reports and general correspondence.



## **ANNEX 3**



**Table A3.1: Annual material resource requirement for producing avocado and yields per acre**

ITEMS	UNITS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Number of plants per acre	48															
<b>LABOUR</b>																
Land clearing	days	40														
Drainage	days	25	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Lining	days	0.5														
Opening holes	days	1.6														
Planting/staking/tying	days	1														
Pruning	days			1	2	3	3	3	3	3	10	10	10	10	10	10
Manual weed control	days	12	12	12	12	6	6	6	6	6	6	6	6	6	6	6
Herbicide application	days	3	3	3	3	9	9	9	9	9	1	1	1	1	1	1
Fertilizing	days	0.5	0.5	0.5	1	1	1	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Pesticide application	days	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
Other	days															
Harvesting	days			1	2	2.5	5	5	6	6	6	6	6	6	6	6
Other	days															
<b>MATERIALS</b>																
Plants	Number	48	5													
Roundup	Litres	3	3	3	3											
Gramoxone	Litres	2	2	2	2											
Fertilizer	Kgs	24	45	45	90	90	90	90	90	90	90	90	90	90	90	90
Benlate	Kgs					0.3	0.3	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Champion	Kgs					0.3	0.3	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Malathion	Litres	1	1	1												
Reglone	Litres	1	1	1	1											
Other																
<b>SERVICES</b>																
Land clearing	Dollars	40	30	50	10	150	170	185	200	200	200	200	200	200	200	200
Transport	Pounds			675	1600	2400	6500	9000	11000	11000	11000	11000	11000	11000	11000	11000
<b>MARKETABLE YIELD</b>																

Table A3.2: Annual material resource requirement for producing mango and yields per acre

ITEMS	UNITS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Number of plants per acre	70															
<b>LABOUR</b>	days															
Land clearing	days	40														
Drainage	days	25	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Lining	days	0.7														
Opening holes	days	2.3														
Planting staking/tying	days	1.4														
Pruning	days		0.5	0.5	2	3	4	4	4	4	4	4	4	4	4	4
Manual weed control	days	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Herbicide application	days	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Fertilizing	days	0.6	0.6	0.6	1	1	1.5	1.5	2	2	2	2	2	2	2	2
Pesticide application	days	1	1	1	3	3	4	4	4	4	4	4	4	4	4	4
Other	days															
Other	days															
Other	days															
Harvesting	days				1	3	10	10	12	12	12	12	12	12	12	12
<b>MATERIALS</b>																
Plants	Number	70	7	3	3											
Roundup	Litres	3	3	3	2											
Gramoxone	Litres	2	2	2	2											
Fertilizer	Kgs	32	64	128	191	191	191	191	191	191	191	191	191	191	191	191
Benlate	Kgs					0.6	0.6	0.6	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Champion	Kgs					0.6	0.6	0.6	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Malathion	Litres	1	1	1	1											
Reglone	Litres	1	1	1	1											
Orchex	Litres	5	7	10	15	15	15	15	15	15	15	15	15	15	15	15
<b>SERVICES</b>																
Land clearing	Dollars	50	30	30	50	150	175	200	200	200	200	200	200	200	200	200
Transport	Pounds				960	2400	8000	9000	12000	12000	12000	12000	12000	12000	12000	12000
<b>MARKETABLE YIELD</b>																

**Table A3.3: Annual material resource requirement for producing soursoop and yields per acre**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Number of plants per acre															
<b>LABOUR</b>															
Land clearing	40	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Drainage	25	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Lining	2														
Opening holes	10														
Planting staking tying	6														
Pruning	48	1	2	2	2	2	2	2	2	2	2	2	2	2	2
Manual weed control		36	36	36	6	6	6	6	6	6	6	6	6	6	6
Herbicide application		3	3	3	3	3	3	3	3	3	3	3	3	3	3
Fertilizing	2	3	4	5	5	5	5	5	5	5	5	5	5	5	5
Pesticide application	1.5	1.5	2	3	3	4	4	4	4	4	4	4	4	4	4
Other															
Other															
Other															
Other															
Harvesting			6	12	12	14	14	14	14	14	14	14	14	14	14
<b>MATERIALS</b>															
Plants	300	30													
Roundup	3	3	3	3											
Gramoxone	2	2	2	2											
Fertilizer	140	275	550	550	550	550	550	550	550	550	550	550	550	550	550
Benlate					7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Champion															
Malathion	1	1	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Reglone	1	1	1	1											
Orchex	5	7	10	15	15	15	15	15	15	15	15	15	15	15	15
<b>SERVICES</b>															
Land Clearing															
Transport	80	40	120	200	225	250	300	300	300	300	300	300	300	300	300
<b>MARKETABLE YIELD</b>															
Dollars			6000	12000	15000	18000	20000	22000	22000	22000	22000	22000	22000	22000	22000
Pounds															

Table A3.4: Annual material resource requirement for producing sapodilla and yields per acre

ITEMS	UNITS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Number of plants per acre	48															
<b>LABOUR</b>																
Land clearing	days	40														
Drainage	days	25	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Luning	days	0.5														
Opening holes	days	1.6														
Planting/staking/tying	days	1														
Pruning	days		0.5	0.5	1	1	1	1	1	1	1	1	1	1	1	1
Manual weed control	days	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Herbicide application	days	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Fertilizing	days	0.5	0.5	0.5	1	1	1	1	1	1	1	1	1	1	1	1
Pesticide application	days	1	1	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Other	days															
Other	days															
Other	days															
Harvesting	days															
<b>MATERIALS</b>																
Plants	Number	48	5	1	4	10	12	14	14	14	14	14	14	14	14	14
Roundup	Litres	3	3	3	3											
Gramoxone	Litres	2	2	2	2											
Fertilizer	Kgs	22	44	88	131	131	131	131	131	131	131	131	131	131	131	131
Bendale	Kgs					7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Champion	Kgs	1	1	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Malabon	Litres	1	1	1	1											
Reglone	Litres															
<b>SERVICES</b>																
Land clearing	Dollars	50	70	50	150	150	175	200	200	200	200	200	200	200	200	200
Transport	Pounds			1000	4000	6000	9000	12000	12000	12000	12000	12000	12000	12000	12000	12000
<b>MARKETABLE YIELD</b>																

**Table A3.6: Annual material resource requirement for producing breadfruit and yields per annum**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Number of plants per acre	48														
<b>LABOUR</b>															
Land clearing	40 days														
Drainage	25 days														
Lining	0.5 days														
Opening holes	1.6 days														
Planting/staking/tying	1 days														
Pruning	0.5 days		0.5	1	2	2	2	2	2	2	2	2	2	2	2
Manual weed control	18 days	18	18	18	18										
Herbicide application	3 days	3	3	3	3										
Fertilizing	0.5 days	1	1	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Pesticide application	1 days	1	1	1	2	2	2	2	2	2	2	2	2	2	2
Other	days														
Other	days														
Other	days														
Other	days														
Harvesting	days			18	26	24	30	36	36	36	36	36	36	36	36
<b>MATERIALS</b>															
Plants	Number	48	5												
Roundup	Litres	3	3	3	3										
Gramoxone	Litres	2	2	2	2										
Fertilizer	Kgs	22	44	88	131	131	131	131	131	131	131	131	131	131	131
Benlate	Kgs														
Champion	Kgs														
Malathion	Litres	1	1	1	2	2	2	2	2	2	2	2	2	2	2
Reglone	Litres	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<b>SERVICES</b>															
Land clearing	Dollars	70	50	100	200	225	250	300	300	300	300	300	300	300	300
Transport	Pounds			2400	12000	15000	25000	28000	28000	28000	28000	28000	28000	28000	28000
<b>MARKETABLE YIELD</b>															

**Table A3.6: Annual material resource requirement for producing papaya, hop pepper and sorrel and yields per acre**

ENTERPRISE	UNITS	Pawpaw Year 1	Year 2	Hot pepper Year 1	Sorrel Year 1
Number of plants per acre	400			3500	
<b>LABOUR</b>	days				
Land clearing	days				
Drainage	days				
Lining	days	2			
Opening holes	days	10		15	10
Planting/staking/tying	days	6		5	2
Pruning	days				
Manual weed control	days			10	10
Herbicide application	days			2	2
Fertilizing	days	2	2	6	4
Pesticide application	days	2	2	4	4
Harvesting	days	12	6	30	45
Other	days				
Other	days				
<b>MATERIALS</b>					
Plants	Number	300		3500	1.1*
Roundup	Litres				
Gramoxone	Litres				
Fertilizer	Kgs	275	275	600	300
Benlate	Kgs			1	
Champion	Kgs			2	2
Malathion	Litres	1.5	1.5	2	2
Reglone	Litres				
Orchex		15	10		
Foliar spray (20+20+20) monthly	Kgs	2.3	2.3		
<b>SERVICES</b>					
Land clearing					
Transport		270	80	200	100
<b>MARKETABLE YIELD</b>		16000	8000	20000	6000

\* Pounds of seeds



**Table A3.7: Per acre annual cost and returns from producing avocado ( Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Number of plants per acre	48														
<b>LABOUR</b>															
Land clearing	370	111	111	111	111	111	111	111	111	111	111	111	111	111	111
Drainage	232														
Lining	5														
Opening holes	15														
Planting staking/tying	9														
Pruning	111	111	111	111	111	111	111	111	111	111	111	111	111	111	111
Manual weed control	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Herbicide application	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Fertilizing	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Pesticide application	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Harvesting															
Other															
Other															
<b>Total labour</b>	783	264	282	315	329	352	352	366	366	357	357	357	357	357	357
<b>MATERIALS</b>															
Plants	72	8													
Roundup	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Gramoxone	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Fertilizer	9	16	16	32	32	32	32	32	32	32	32	32	32	32	32
Benlate					15	15	31	31	31	31	31	31	31	31	31
Champion					2	2	3	3	3	3	3	3	3	3	3
Malathion	14	14	14												
Reglone	6	6	6	6											
<b>Total Materials</b>	191	134	126	128	49	49	66	66	66	66	66	66	66	66	66
<b>SERVICES</b>															
Land clearing	40	30	50	10	150	170	185	200	200	200	200	200	200	200	200
Transport of inputs	40	30	50	10	150	170	185	200	200	200	200	200	200	200	200
<b>Total Services</b>															
<b>GROSS RETURNS</b>															
<b>COSTS</b>	1014	429	459	453	528	571	603	632	632	623	623	623	623	623	623
Labour	783	265	282	315	329	352	352	366	366	357	357	357	357	357	357
Materials	191	134	126	128	49	49	66	66	66	66	66	66	66	66	66
Services	40	30	50	10	150	170	185	200	200	200	200	200	200	200	200
<b>Net returns</b>	-1014	-429	-229	91	288	1639	2457	3108	3108	3117	3117	3117	3117	3117	3117

**Table A3.8: Per acre annual cost and return from producing mango (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Number of plants per acre	70														
<b>LABOUR</b>															
Land clearing	370	111	111	111	111	111	111	111	111	111	111	111	111	111	111
Drainage	232														
Lining	6														
Opening holes	22														
Planting staking/tying	13														
Pruning	13	5	5	19	28	37	37	37	37	37	37	37	37	37	37
Manual weed control	167	167	167	167											
Herbicide application	28	28	28	28											
Fertilizing	6	6	6	9	9	14	14	19	19	19	19	19	19	19	19
Pesticide application	9	9	9	28	28	37	37	37	37	37	37	37	37	37	37
Harvesting				9	28	93	93	111	111	111	111	111	111	111	111
Total labour	852	325	325	370	204	292	292	315	315	315	315	315	315	315	315
<b>MATERIALS</b>															
Plants	105	11	11												
Roundup	69	69	69	69											
Gramoxone	20	20	20	20											
Fertilizer	12	23	46	69	69	69	69	69	69	69	69	69	69	69	69
Benlate					31	31	61	61	61	61	61	61	61	61	61
Champion					3	3	7	7	7	7	7	7	7	7	7
Malathion	14	14	14												
Reglone	6	6	6	6											
Orchex	75	105	150	225	225	225	225	225	225	225	225	225	225	225	225
Total Materials	302	249	306	390	328	328	362	362	362	362	362	362	362	362	362
<b>SERVICES</b>															
Land clearing															
Transport	50	30	30	50	150	175	200	200	200	200	200	200	200	200	200
Total Services	50	30	30	50	150	175	200	200	200	200	200	200	200	200	200
<b>GROSS RETURNS</b>															
<b>COSTS</b>															
Labour	1204	605	661	163	408	1360	1530	2040	2040	2040	2040	2040	2040	2040	2040
Materials	852	326	325	370	204	292	292	315	315	315	315	315	315	315	315
Services	302	249	306	390	328	328	362	362	362	362	362	362	362	362	362
	50	30	30	50	150	175	200	200	200	200	200	200	200	200	200
<b>Net returns</b>	-1204	-605	-661	-647	-273	566	677	1164	1164	1164	1164	1164	1164	1164	1164

**Table A3.9: Per acre annual cost and returns from producing sourrop (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Number of plants per acre	300														
<b>LABOUR</b>															
Land clearing	370														
Drainage	232	111	111	111	111	111	111	111	111	111	111	111	111	111	111
Lining	19														
Opening holes	93														
Planting staking tying	56														
Pruning	0	9	19	19	19	19	19	19	19	19	19	19	19	19	19
Manual weed control	444	333	333	333	333	333	333	333	333	333	333	333	333	333	333
Herbicide application	0	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Fertilizing	19	28	37	46	46	46	46	46	46	46	46	46	46	46	46
Pesticide application	14	14	19	28	28	37	37	37	37	37	37	37	37	37	37
Harvesting	0	0	56	111	111	130	130	130	130	130	130	130	130	130	130
Total labour	1245	523	602	676	370	398	398	398	398	398	398	398	398	398	398
<b>MATERIALS</b>															
Plants	360	36													
Roundup	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Gramoxone	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Fertilizer	50	99	198	198	198	198	198	198	198	198	198	198	198	198	198
Benlate					383	383	383	383	383	383	383	383	383	383	383
Champion	14	14	14	21	21	21	21	21	21	21	21	21	21	21	21
Malathion															
Reglone	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Other	75	105	150	225	225	225	225	225	225	225	225	225	225	225	225
Total Materials	589	350	458	540	827	827	827	827	827	827	827	827	827	827	827
<b>SERVICES</b>															
Land clearing	80	40	120	200	225	250	300	300	300	300	300	300	300	300	300
Transport	80	40	120	200	225	250	300	300	300	300	300	300	300	300	300
Total Services															
<b>GROSS RETURNS</b>															
<b>COSTS</b>															
Labour	1915	919	1180	1416	1422	1475	1525	1525	1525	1525	1525	1525	1525	1525	1525
Materials	1245	529	602	676	370	398	398	398	398	398	398	398	398	398	398
Services	589	350	458	540	827	827	827	827	827	827	827	827	827	827	827
Total	80	40	120	200	225	250	300	300	300	300	300	300	300	300	300
<b>Net returns</b>	-1915	-919	-220	504	978	1405	1675	1995	1995	1995	1995	1995	1995	1995	1995

**Table A3.10: Per acre annual costs and returns from producing sapodilla (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Number of plants per acre	48														
<b>LABOUR</b>															
Land clearing	370	111	111	111	111	111	111	111	111	111	111	111	111	111	111
Drainage	232														
Lining	5														
Opening holes	15														
Planting/staking/tying	9														
Pruning	5	5	5	9	9	9	9	9	9	9	9	9	9	9	9
Manual weed control	167	167	167	167	167	167	167	167	167	167	167	167	167	167	167
Herbicide application	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Fertilizing	5	5	5	9	9	9	9	14	14	14	14	14	14	14	14
Pesticide application	9	9	9	14	14	14	14	14	14	14	14	14	14	14	14
Harvesting	9	9	9	37	93	111	130	130	130	130	130	130	130	130	130
Total labour	839	324	333	375	236	255	273	278	278	278	278	278	278	278	278
<b>WATERIALS</b>															
Plants	72	8													
Roundup	69														
Gramoxone	20	20	20	20	47	47	47	47	47	47	47	47	47	47	47
Fertilizer	8	16	32	47	383	383	383	383	383	383	383	383	383	383	383
Benlate															
Charption															
Malathion	14	14	14	21	21	21	21	21	21	21	21	21	21	21	21
Reglone	6	6	6	6											
Total Materials	190	64	72	95	451	451	451	451	451	451	451	451	451	451	451
<b>SERVICES</b>															
Land clearing	50	70	50	150	150	175	200	200	200	200	200	200	200	200	200
Transport	50	70	50	150	150	175	200	200	200	200	200	200	200	200	200
Total Services	50	70	50	150	150	175	200	200	200	200	200	200	200	200	200
<b>GROSS RETURNS</b>															
COSTS															
Labour	1079	459	456	620	1440	2160	2880	2880	2880	2880	2880	2880	2880	2880	2880
Materials	839	325	333	375	837	880	924	929	929	929	929	929	929	929	929
Services	190	64	72	95	236	255	273	278	278	278	278	278	278	278	278
	50	70	50	150	451	451	451	451	451	451	451	451	451	451	451
Net returns	-1079	-459	-216	340	603	1280	1956	1951	1951	1951	1951	1951	1951	1951	1951

**Table A3.11: Annual per acre costs and returns from producing breadfruit (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Number of plants per acre	48														
<b>LABOUR</b>															
Land clearing	370														
Drainage	232	111	111	111	111	111	111	111	111	111	111	111	111	111	111
Lining	5														
Opening holes	15														
Planting/staking/tying	9														
Pricing	5	5	9	19	19	19	19	19	19	19	19	19	19	19	19
Manual weed control	167	167	167	167	167	167	167	167	167	167	167	167	167	167	167
Herbicide application	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Fertilizing	5	9	9	14	14	14	14	14	14	14	14	14	14	14	14
Pesticide application	9	9	9	19	19	19	19	19	19	19	19	19	19	19	19
Harvesting			167	241	222	278	333	333	333	333	333	333	333	333	333
Total labour	844	329	500	597	384	440	495	495	495	495	495	495	495	495	495
<b>MATERIALS</b>															
Plants	72	8													
Roundup	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Gramoxone	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Fertilizer	8	16	32	47	47	47	47	47	47	47	47	47	47	47	47
Benlate															
Champion															
Malathion	14	14	14	28	28	28	28	28	28	28	28	28	28	28	28
Reglone	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Total Materials	190	134	142	171	75	75	75	75	75	75	75	75	75	75	75
<b>SERVICES</b>															
Land clearing	70	50	100	200	225	250	300	300	300	300	300	300	300	300	300
Transport	70	50	100	200	225	250	300	300	300	300	300	300	300	300	300
Total Services															
<b>GROSS RETURNS</b>															
<b>COSTS</b>															
Labour	1103	513	742	969	685	765	871	871	871	871	871	871	871	871	871
Materials	844	330	500	597	384	440	495	495	495	495	495	495	495	495	495
Services	190	133	142	171	75	75	75	75	75	75	75	75	75	75	75
Total	70	50	100	200	225	250	300	300	300	300	300	300	300	300	300
Net returns	-1103	-513	-598	-249	215	735	809	809	809	809	809	809	809	809	809

**Table A3.12: Per acre costs and returns from producing sorrel, hot pepper and papaya (Constant US\$)**

ITEMS	Sorrel	Hot pepper	Papaya Year 1	Papaya Year 2*
Number of plants per acre	-	3500	400	
<b>LABOUR</b>				
Land clearing				
Drainage				
Lining			19	
Opening holes	93	139	93	
Planting/staking/tying	19	46	56	
Pruning				
Manual weed control	93	93		
Herbicide application	19	19		
Fertilizing	37	56	19	19
Pesticide application	37	37	19	19
Other	46	46		
Harvesting	417	278	111	56
Total Labour	759	713	315	93
<b>MATERIALS</b>				
Plants		210	300	
Roundup				
Gramoxone				
Fertilizer	108	216	99	99
Benlate		51		
Champion	11	11		
Malathion	28	28	21	21
Reglone				
Foliar spray			225	150
Total Materials	147	516	682	307
<b>SERVICES</b>				
Land clearing				
Transport of inputs	100	200	270	80
Total Services	100	200	270	80
<b>GROSS RETURNS</b>	4320	7000	2720	1360
<b>COSTS</b>	1007	1429	1267	480
Labour	759	713	315	93
Materials	147	516	682	307
Services	100	200	270	80
Net returns	3313	5571	1453	880

\* Due to the presence of bunchy top disease in Grenada which affects papaya, the assumption is made that for the second Year, 50% of the plants would have been destroyed. The fields would have been fully destroyed by the third Year after planting.

**Table A3.13: Financial analysis of farm model participation in the project (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>INVESTMENTS</b>																
<b>Overall Farm Investments</b>																
Bow saw			10						10							
Hand pruning saw			21						21							
Knapsac sprayer			169						169							
Mist blower			0						0							
Weedeater			456						456							
Fork			59						59							
Spade			28						28							
File			6						6							
Cutlass			7						7							
Secateurs			19						19							
5 field crates			250						250							
<b>Total overall farm Investments</b>			1023						1023							
<b>Enterprise investment costs</b>			748													
Mango 3			748													
<b>Total enterprise investment costs</b>			748													
<b>TOTAL FARM INVESTMENT</b>																
			1771						1023							
<b>Enterprise operating costs</b>			1204	605	661	810	681	794	853	876	876	876	876	876	876	876
Mango 3			715													
Hotpepper 3			503	715												
Sorrel 3																
Hotpepper					503											
Sorrel 4				75	75	75	75	75	75	75	75	75	75	75	75	75
Equipment rental maintenance			1674	1898	736	885	756	869	928	951	951	951	951	951	951	951
<b>Total enterprise operating costs</b>			1218	1218	736	885	756	869	928	951	951	951	951	951	951	951
Intercrops			456	680	736	885	756	869	928	951	951	951	951	951	951	951
Treecrops																
<b>Incremental working capital</b>			3445	-1162	149	-129	113	1082	-1000							
Intercrops			1218	-1218												
Treecrops			2227	56	149	-129	113	1082	-1000							
<b>TOTAL OUTFLOW</b>			3445	736	885	756	869	1952	951	951	951	951	951	951	951	951

Crop name followed by a number indicates the project Year in which the crop is planted.

Table A3.13 (continued)

FARM MODEL 1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>INFLOW</b>																
Farm production																
Mango 1			1700			182	436	1520	1710	2280	2280	2280	2280	2280	2280	2280
Hotpepper 1			2220													
Sorrel 1				1700												
Hotpepper 4																
Sorrel 4				2220												
Total farm production			4920	4920		182	436	1520	1710	2280	2280	2280	2280	2280	2280	2280
<b>Residual Value</b>																
Intercrop																
Free crops	1															988
<b>TOTAL INFLOW</b>																
Net benefit before financing	0	-1115	4022	9184	-885	-574	-413	432	759	1329	1329	1329	1329	1329	1329	2280
NPV (12%)	58,456.1	IRR	87%													
<b>FINANCING</b>																
Short term loan receipts		1218	1218	1340	1340											
Debt service (short term)			1340	122	122											
Short term interest payments			122	122	1340											
Net short term financing		1218	122	1340	885											
Net benefit after short term financing		2227	1900	884		574	413	432	759	1329	1329	1329	1329	1329	1329	2280
<b>Long term loan receipts</b>																
Principal outstanding		2227	680	716	885	432	432	394	326	258	180	93				
Long term debt service			2227	2907	1633	432	432	1030	1030	1030	1030	1030	1030	1030	1030	1030
Principal			223	291	164	433	433	397	326	259	181	93				
Interest			223	291	164	433	433	397	326	259	181	93				
Net long term financing		2227	437	445	921	-433	-433	-1040	1030	1030	1030	1030	1030	1030	1030	
Net Benefit After Financing			4158	4790	-164	1027	666	-1471	281	289	289	289	289	289	289	2280
Accumulative Balance			4158	8647	8283	7256	6390	4918	4637	4926	9219	8504	8292	7121	6139	10729
NPV (12%)			98,842													

(Crop name followed by a number indicates the project Year in which the crop is planted)



**Table A3.14: Financial analysis of farm Model participation in the project (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>INVESTMENTS</b>																
<b>Overall Farm Investments</b>																
Bow saw			10						10							
Hand pruning saw			21						21							
Knapsac sprayer			169						169							
Mist blower			0						0							
Weedeater			456						456							
Fork			59						59							
Spade			28						28							
File			6						6							
Cutlass			7						7							
Secateurs			19						19							
5 field crates			250						250							
<b>Total overall farm Investments</b>			1023						1023							
<b>Enterprise investment costs</b>																
Mango 3			1496													
<b>Total enterprise investment cost</b>			1496													
<b>TOTAL FARM INVESTMENT</b>																
			2519						1023							
<b>Enterprise operating costs</b>																
Mango 3			2407	1210	1322	1620	1363	1589	1707	1753	1753	1753	1753	1753	1753	1753
Pawpaw 3			1267	480												
Hotpepper			715													
Sorrel 3			503													
Hotpepper 4				715												
Sorrel 4				503												
Equipment rental maintenance			75	75	75	75	75	75	75	75	75	75	75	75	75	75
<b>Total enterprise operating costs</b>			3472	2982	1397	1695	1438	1664	1782	1828	1828	1828	1828	1828	1828	1828
Intercrops			2485	1698	0	0	0	0	0	0	0	0	0	0	0	0
Treecrops			987	1285	1397	1695	1438	1664	1782	1828	1828	1828	1828	1828	1828	1828
<b>Incremental working capital</b>			0	5991	-3008	-1585	298	-257	1141	-977	0	0	0	0	0	0
Intercrops			0	2485	-787	-1698	0	0	0	0	0	0	0	0	0	0
Treecrops			0	3506	-2221	112	298	-257	1141	-977	0	0	0	0	0	0
<b>TOTAL OUTFLOW</b>			0	5991	2982	1397	1695	1438	2805	1828	1828	1828	1828	1828	1828	1828

Crop name followed by a number indicates the project Year in which the crop is planted.

Table A3.14 (continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>INFLOW</b>																
<b>Farm production</b>																
Mango 3	0	0	0	0	0	365	912	3040	3420	4560	4560	4560	4560	4560	4560	4560
Pawpaw 3	0	0	3040	1520	0	0	0	0	0	0	0	0	0	0	0	0
Hotpepper 3	0	0	3700	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 3	0	0	2220	0	0	0	0	0	0	0	0	0	0	0	0	0
Hotpepper 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total farm production	0	0	8960	7440	0	365	912	3040	3420	4560	4560	4560	4560	4560	4560	4560
<b>Residual Value</b>																
Intercrops																1828
Tree crops																
<b>TOTAL INFLOW</b>	0	0	8960	7440	0	365	912	3040	3420	4560	4560	4560	4560	4560	4560	6388
<b>Net Benefit Before Financing</b>	0	-5991	5978	6043	-1695	-1073	-752	235	1592	2732	2732	2732	2732	2732	2732	4560
<b>NPV (12%)</b>	<b>\$7,770</b>															
<b>IRR</b>		<b>55%</b>														
<b>FINANCING</b>																
<b>Short-term loan receipts</b>	0	2485	1698	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Debt service (short-term)</b>	0	0	2734	1868	0	0	0	0	0	0	0	0	0	0	0	0
<b>Interest payments (short-term)</b>	0	0	249	170	0	0	0	0	0	0	0	0	0	0	0	0
<b>Net short term financing</b>	0	2485	-1036	-1868	0	0	0	0	0	0	0	0	0	0	0	0
<b>Net benefit after short financing</b>	0	-3506	4942	-1175	-1695	-1073	-752	235	1592	2732	2732	2732	2732	2732	2732	4560
<b>Long-term loan receipts</b>																
<b>Principal outstanding</b>	0	3506	1285	1397	1695	0	0	0	0	0	0	0	0	0	0	0
<b>Long-term debt service</b>			4791	6188	7883	7883	7883	6861	5737	4501	3141	1645	-1	0	0	0
<b>Principal</b>			351	479	619	788	788	1810	1810	1810	1810	1810	1810	1810	1810	0
<b>Interest</b>			0	0	0	0	0	1022	1124	1236	1360	1496	1646	0	0	0
<b>Net long-term financing</b>	0	3506	934	918	1076	-788	-788	-1810	-1810	-1810	-1810	-1810	-1810	0	0	0
<b>Net Benefit After Financing</b>	0	0	5876	5093	-619	-1861	-1540	-1575	-218	922	922	922	922	2732	2732	4560
<b>Accumulative Balance</b>	0	0	5876	10969	10350	8489	6949	5374	5156	6078	7000	7922	8844	11576	14308	18868
<b>NPV (12%)</b>																<b>\$8,429</b>

Crop name followed by a number indicates the project Year in which the crop is planted.

**Table A3.16: Financial analysis of Farm Model Type 3 participation in the project (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>INVESTMENTS</b>																
<b>Overall Farm Investments</b>																
Bow saw		20						20								
Hand pruning saw		41						41								
Knapsac sprayer		337						337								
Mist blower		652						652								
Weedeater		456						456								
Fork		119						119								
Spade		56						56								
File		11						11								
Cutlass		15						15								
Secateurs		37						37								
10 field crates		500						500								
<b>Total overall farm Investments</b>	0	2243	0	0	0	0	0	2243	0	0	0	0	0	0	0	0
<b>Enterprise investment costs</b>																
Mango 2	0	748	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mango 3	0	0	1496	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 4	0	0	0	703	0	0	0	0	0	0	0	0	0	0	0	0
Mango 4	0	0	0	748	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total enterprise investment costs</b>	0	748	1496	1451	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL FARM INVESTMENT</b>	0	2991	1496	1451	0	0	0	2243	0	0	0	0	0	0	0	0

Crop name followed by a number indicates the project Year in which the crop is planted.

Table A3.15 (Continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Enterprise operating costs</b>																
Mango 2	0	1204	605	661	810	681	794	853	876	876	876	876	876	876	876	876
Hotpepper 2	0	715	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 2	0	503	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mango 3	0	0	2407	1210	1322	1620	1363	1589	1707	1753	1753	1753	1753	1753	1753	1753
Papaya 3	0	0	1267	480	0	0	0	0	0	0	0	0	0	0	0	0
Hot pepper 3	0	0	1429	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 3	0	0	1007	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 4	0	0	0	1014	429	439	453	528	571	603	632	632	623	623	623	623
Mango 4	0	0	0	1204	605	661	810	681	794	853	876	876	876	876	876	876
Papaya 4	0	0	0	1267	480	0	0	0	0	0	0	0	0	0	0	0
Hot Pepper 4	0	0	0	1429	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 4	0	0	0	1007	0	0	0	0	0	0	0	0	0	0	0	0
Hotpepper 5	0	0	0	0	715	0	0	0	0	0	0	0	0	0	0	0
Sorrel 5	0	0	0	0	503	0	0	0	0	0	0	0	0	0	0	0
Equipment rental maintenance	0	0	150	150	150	150	150	150	150	150	150	150	150	150	150	150
<b>Total enterprise operating costs</b>																
	0	1674	5369	6971	5013	3571	3570	3802	4099	4236	4288	4288	4279	4279	4279	4279
<b>Intercrops</b>	0	1218	3703	4183	1698	0	0	0	0	0	0	0	0	0	0	0
<b>Treecrops</b>	0	456	1516	2638	3166	3421	3420	3652	3949	4086	4138	4138	4129	4129	4129	4129
Year 2 establishment	0	456	605	661	810	681	794	853	876	876	876	876	876	876	876	876
Year 3 establishment	0	0	912	1210	1322	1620	1363	1589	1707	1753	1753	1753	1753	1753	1753	1753
Year 4 establishment	0	0	0	767	1033	1120	1263	1210	1366	1457	1509	1509	1499	1499	1499	1499
<b>Incremental working capital</b>																
	4665	2051	1556	-3408	-1442	-1	231	297	137	52	0	-9	0	0	0	0
<b>Intercrops</b>	1218	2485	480	-2485	-1698	0	0	0	0	0	0	0	0	0	0	0
<b>Treecrops</b>	3447	-434	1076	-923	256	-1	231	297	137	52	0	-9	0	0	0	0
Year 2 establishment	3447	-2842	56	149	-129	113	59	23	0	0	0	0	0	0	0	0
Year 3 establishment	0	2407	-1198	112	298	-257	226	118	46	0	0	0	0	0	0	0
Year 4 establishment	0	0	2218	-1184	86	143	-54	156	91	52	0	-9	0	0	0	0
<b>TOTAL OUTFLOW</b>	4665	6715	8421	5013	3571	3570	3802	6342	4236	4288	4288	4279	4279	4279	4279	4279

Crop name followed by a number indicates the project Year in which the crop was planted.

Table A3.15 (continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>INFLOWS</b>																
<b>Farm production</b>																
Mango 2	0	0	0	0	182	456	1520	1710	2280	2280	2280	2280	2280	2280	2280	2280
Hotpepper	0	3700	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 2	0	2220	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mango 3	0	0	0	0	0	365	912	3040	3420	4560	4560	4560	4560	4560	4560	4560
Pawpaw 3	0	0	3040	1520	0	0	0	0	0	0	0	0	0	0	0	0
Hpt pepper 3	0	0	7400	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 3	0	0	4440	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mango 4	0	0	0	0	0	243	576	864	2340	3240	3960	3960	3960	3960	3960	3960
Pawpaw 4	0	0	0	3040	1520	0	0	0	1520	1710	2280	2280	2280	2280	2280	2280
Hotpepper	0	0	0	7400	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 4	0	0	0	4440	0	0	0	0	0	0	0	0	0	0	0	0
Hotpepper	0	0	0	0	3700	0	0	0	0	0	0	0	0	0	0	0
Sorrel 5	0	0	0	0	2220	0	0	0	0	0	0	0	0	0	0	0
<b>Total farm production</b>	<b>0</b>	<b>5920</b>	<b>14880</b>	<b>16400</b>	<b>7622</b>	<b>1064</b>	<b>3190</b>	<b>6070</b>	<b>9560</b>	<b>11790</b>	<b>13080</b>	<b>13080</b>	<b>13080</b>	<b>13080</b>	<b>13080</b>	<b>13080</b>
<b>Residual Value</b>																
Intercrop																4129
Tree crops																
<b>TOTAL INFLOW</b>	<b>0</b>	<b>5920</b>	<b>14880</b>	<b>16400</b>	<b>7622</b>	<b>1064</b>	<b>3190</b>	<b>6070</b>	<b>9560</b>	<b>11790</b>	<b>13080</b>	<b>13080</b>	<b>13080</b>	<b>13080</b>	<b>13080</b>	<b>17209</b>
<b>Net benefit before financing</b>	<b>-4665</b>	<b>-795</b>	<b>6459</b>	<b>11387</b>	<b>4051</b>	<b>-2507</b>	<b>-611</b>	<b>-272</b>	<b>5324</b>	<b>7502</b>	<b>8792</b>	<b>8801</b>	<b>8801</b>	<b>8801</b>	<b>8801</b>	<b>12930</b>
<b>NPV (12%)</b>	<b>\$27,254</b>	<b>IRR</b>	<b>69%</b>													

Crop name followed by a number indicates the project Year in which the crop was planted.

Table A3.15 (continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>FINANCING</b>																
Short-term loan receipts	1218	3703	4183	1698	0	0	0	0	0	0	0	0	0	0	0	0
Short-term debt service		1340	4073	4601	1868	0	0	0	0	0	0	0	0	0	0	0
Short-term interest payments	0	122	370	418	170	0	0	0	0	0	0	0	0	0	0	0
Net short term financing	1218	2363	109	-2903	-1868	0	0	0	0	0	0	0	0	0	0	0
Net benefit after short financing	-3447	1568	6568	8483	2184	-2507	-611	-272	5324	7502	8792	8801	8801	8801	8801	12930
Loan receipts (treecrop 2)	3447	605	661	810	681	0	0	0	0	0	0	0	0	0	0	0
Principal outstanding	3447	4052	4713	5523	6204	6204	5400	4515	3542	2472	1294	-1	0	0	0	0
Debt service (treecrop 2)		345	405	471	552	620	1425	1425	1425	1070	1177	1425	0	0	0	0
Principal		0	0	0	0	0	804	885	973	1070	1177	1295	0	0	0	0
Interest		345	405	471	552	620	620	540	452	354	247	129	0	0	0	0
Loan receipts (treecrop 3)		2407	1210	1322	1620	1363	7922	6895	5766	4523	3156	1653	0	0	0	0
Principal outstanding		2407	3617	4939	6559	7922	792	1819	1819	1819	1819	1819	1819	0	0	0
Debt service (treecrop 3)			241	362	494	656	792	1027	1130	1243	1367	1503	1654	0	0	0
Principal			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest			241	362	494	656	792	792	690	577	452	316	165	0	0	0
Loan receipts (treecrop 4)	0	0	2218	1033	1120	1263	1210	6843	5936	4981	3907	2727	1428	0	0	0
Principal outstanding	0	0	2218	3251	4371	5634	6843	684	1571	1571	1571	1571	1571	0	0	0
Debt service (treecrop 4)			0	222	325	437	563	684	887	976	1073	1181	1299	1429	0	0
Principal			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest			0	222	325	437	563	684	684	596	498	391	273	143	0	0
Total Loan Receipts	3447	3012	4089	3166	3421	2626	1210	0	0	0	0	0	0	0	0	0
Total Principal Outstanding	3447	6459	10548	13713	17134	19760	20166	18254	15264	11976	8358	4379	1428	0	0	0
Total long-term debt Service	0	345	646	1055	1371	1713	2780	3928	4815	4815	4815	4815	3391	1571	0	0
Principal		0	0	0	0	0	804	1911	2990	3289	3618	3979	2953	1429	0	0
Interests		345	646	1055	1371	1713	1976	2017	1825	1526	1198	836	438	143	0	0
Net long-term financing	3447	2668	3443	2111	2050	913	-1571	-3928	-4815	-4815	-4815	-4815	-3391	-1571	0	0
Net Benefit After Financing	0	4236	10011	10594	4234	-1594	-2182	-4200	509	2687	3977	3986	5411	7230	8801	12930
Accumulative Balance	0	4236	14246	24840	29074	27480	25298	21098	21607	24294	28271	32257	37668	44898	53699	66629
NPV (12%)																\$28,894

Crop name followed by a number indicates the project Year in which the crop was planted.

**Table A3.16: Financial Analysis of Farm Model Type 4 participation in the project (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>INVESTMENT</b>																
<b>Overall Farm Investments</b>																
Bow saw		30						30								
Hand pruning saw		62						62								
Knapsac sprayer		674						674								
Mist blower		652						652								
Weedeater		1367						1367								
Fork		119						119								
Spade		56						56								
File		11						11								
Cutlass		15						15								
Secateurs		37						37								
10 field crates		500						500								
<b>Total overall farm Investments</b>	0	3022	0	0	0	0	0	3022	0	0	0	0	0	0	0	0
<b>Enterprise investment costs</b>																
Mango 2	0	1496	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 3	0	0	703	0	0	0	0	0	0	0	0	0	0	0	0	0
Mango 3	0	0	748	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 4	0	0	0	703	0	0	0	0	0	0	0	0	0	0	0	0
Mango 4	0	0	0	1496	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 5	0	0	0	0	703	0	0	0	0	0	0	0	0	0	0	0
Mango 5	0	0	0	0	1496	0	0	0	0	0	0	0	0	0	0	0
<b>Total enterprise investment costs</b>	0	1496	1451	2199	2199	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL FARM INVESTMENT</b>	0	4518	1451	2199	2199	0	0	3022	0	0	0	0	0	0	0	0

Crop name followed by a number indicates the project Year in which the crop was planted.

Table A3.16 (continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Enterprise operating costs</b>																
Mango 2	0	2407	1210	1322	1620	1363	1589	1707	1753	1753	1753	1753	1753	1753	1753	1753
Pawpaw 2	0	1267	480	0	0	0	0	0	0	0	0	0	0	0	0	0
Hoipepper 2	0	1429	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 3	0	0	1014	429	439	433	528	571	603	632	632	623	623	623	623	623
Mango 3	0	0	1204	605	661	810	681	794	853	876	876	876	876	876	876	876
Pawpaw 3	0	0	1267	480	0	0	0	0	0	0	0	0	0	0	0	0
Hoipepper 3	0	0	1429	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 3	0	0	1007	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 4	0	0	0	1014	429	439	433	528	571	603	632	632	623	623	623	623
Mango 4	0	0	0	2407	1210	1322	1620	1363	1589	1707	1753	1753	1753	1753	1753	1753
Pawpaw 4	0	0	0	2534	960	0	0	0	0	0	0	0	0	0	0	0
Hoipepper 4	0	0	0	1429	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 4	0	0	0	1007	0	0	0	0	0	0	0	0	0	0	0	0
Mango 5	0	0	0	0	1204	605	661	810	681	794	853	876	876	876	876	876
Soursop 5	0	0	0	0	1915	919	1180	1416	1422	1475	1525	1525	1525	1525	1525	1525
Sapodilla 5	0	0	0	0	1079	439	436	620	837	880	924	929	929	929	929	929
Pawpaw 5	0	0	0	0	2534	960	0	0	0	0	0	0	0	0	0	0
Hoipepper 5	0	0	0	0	1429	0	0	0	0	0	0	0	0	0	0	0
Sorrel 5	0	0	0	0	1007	0	0	0	0	0	0	0	0	0	0	0
Equipment rental/maintenance	0	0	0	200	200	200	200	200	200	200	200	200	200	200	200	200
<b>Total enterprise operating costs</b>	0	3608	6160	9228	12506	7549	7368	8009	8510	8921	9149	9167	9158	9158	9158	9158
<b>Intercrop operating costs</b>	0	2696	4183	5450	5930	960	0	0	0	0	0	0	0	0	0	0
<b>Treecrop operating costs</b>	0	912	1977	3578	6377	6389	7168	7809	8310	8721	8949	8967	8958	8958	8958	8958
Year 2 establishment	0	912	1210	1322	1620	1363	1589	1707	1753	1753	1753	1753	1753	1753	1753	1753
Year 3 establishment	0	0	767	1033	1120	1263	1210	1366	1457	1509	1509	1499	1499	1499	1499	1499
Year 4 establishment	0	0	0	1223	1638	1781	2073	1891	2160	2310	2385	2385	2376	2376	2376	2376
Year 5 establishment	0	0	0	0	1999	1982	2297	2846	2940	3150	3302	3330	3330	3330	3330	3330
<b>Incremental working capital</b>	8126	-516	3617	3278	-7156	-181	641	501	411	228	19	-9	0	0	0	0
<b>Intercroops</b>	2696	1486	1267	480	-4970	-960	0	0	0	0	0	0	0	0	0	0
<b>Treecroops</b>	5429	-2002	2350	2798	-2186	779	641	501	411	228	19	-9	0	0	0	0
Year 2 establishment	5429	-4220	112	298	-257	226	118	46	0	0	0	0	0	0	0	0
Year 3 establishment	0	2218	-1184	86	143	-54	156	91	52	0	-9	0	0	0	0	0
Year 4 establishment	0	0	3421	-1783	143	292	-182	269	150	75	0	-9	0	0	0	0
Year 5 establishment	0	0	0	-4197	-2215	314	549	95	209	152	28	0	0	0	0	0
<b>TOTAL OUTFLOW</b>	8126	7610	11227	14705	7549	7368	8009	11532	8921	9149	9167	9158	9158	9158	9158	9158

Crop name followed by a number indicates the project Year in which the crop was planted.



Table A3.16 (continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>INFLOW</b>																
Farm production																
Mango 2	0	0	0	0	365	912	3040	3420	4560	4560	4560	4560	4560	4560	4560	4560
Pawpaw 2	0	3040	1520	0	0	0	0	0	0	0	0	0	0	0	0	0
Hotpepper 2	0	7400	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 3	0	0	0	0	243	576	864	2340	3240	3960	3960	3960	3960	3960	3960	3960
Mango 3	0	0	0	0	0	182	456	1520	1710	2280	2280	2280	2280	2280	2280	2280
Pawpaw 3	0	0	3040	1520	0	0	0	0	0	0	0	0	0	0	0	0
Hotpepper 3	0	0	7400	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 3	0	0	4440	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 4	0	0	0	0	0	243	576	864	2340	3240	3960	3960	3960	3960	3960	3960
Mango 4	0	0	0	0	0	0	365	912	3040	3420	4560	4560	4560	4560	4560	4560
Pawpaw 4	0	0	0	6080	3040	0	0	0	0	0	0	0	0	0	0	0
Passionfruit 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hotpepper 4	0	0	0	7400	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 4	0	0	0	4440	0	0	0	0	0	0	0	0	0	0	0	0
Mango 5	0	0	0	0	0	0	0	182	456	1520	1710	2280	2280	2280	2280	2280
Soursop 5	0	0	0	0	0	0	1080	2160	2700	3240	3600	3960	3960	3960	3960	3960
Sapodilla 5	0	0	0	0	0	0	260	1040	1560	2340	3120	3120	3120	3120	3120	3120
Pawpaw 5	0	0	0	0	6080	3040	0	0	0	0	0	0	0	0	0	0
Hotpepper 5	0	0	0	0	7400	0	0	0	0	0	0	0	0	0	0	0
Sorrel 5	0	0	0	0	4440	0	0	0	0	0	0	0	0	0	0	0
<b>Total farm production</b>	0	10440	16400	19440	21568	4953	6641	12438	19606	24560	27750	28680	28680	28680	28680	28680
<b>Residual Value</b>																
Intercrop																8958
Tree crops																
<b>TOTAL INFLOW</b>	0	10440	16400	19440	21568	4953	6641	12438	19606	24560	27750	28680	28680	28680	28680	28680
<b>Net benefit before financing</b>	-8126	2830	5173	4735	14019	-2415	-1368	907	10685	15411	18583	19522	19522	19522	19522	28480
<b>NPV (12%) \$49,302 ;</b>	<b>IRR</b>	<b>58%</b>														

Crop name followed by a number indicates the project Year in which the crop was planted.

Table A3.16 (continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>FINANCING</b>																
Short-term loan receipts	2696	4183	5450	5930	960	0	0	0	0	0	0	0	0	0	0	0
Debt service (short-term)	0	2966	4601	5995	6523	1056	0	0	0	0	0	0	0	0	0	0
Interest payments (short-term)	0	270	418	545	593	96	0	0	0	0	0	0	0	0	0	0
Net short term financing	2696	1217	849	-65	-5563	-1056	0	0	0	0	0	0	0	0	0	0
Net benefit after short financing	-5429	4047	6022	4670	8456	-3470	-1368	907	10685	15411	18383	19322	19322	19322	19322	28480
<b>Long term financing</b>																
Loan receipts (treecrop 2)	5429	1210	1322	1620	1363	0	0	0	0	0	0	0	0	0	0	0
Principal outstanding	6639	7961	9581	9581	10944	10944	9526	7965	6249	4360	2283	0	0	0	0	0
Debt service (treecrop 2)	543	664	664	796	958	1094	2513	2513	2513	2513	2513	2513	2513	2513	2513	2513
Principal	0	0	0	0	0	0	1419	1560	1716	1888	2077	2285	2285	2285	2285	2285
Interest	543	664	664	796	958	1094	1094	953	797	625	436	228	0	0	0	0
Loan receipts (treecrop 3)	0	2218	1033	1120	1263	1210	6843	5956	4981	3907	2727	1428	0	0	0	0
Principal outstanding	0	0	3421	5060	6840	8914	10805	10805	9404	7863	6169	4305	2254	0	0	0
Debt service (treecrop 3)	0	0	0	342	506	684	891	1080	2481	2481	2481	2481	2481	2481	2481	2481
Principal	0	0	0	0	0	0	0	0	1400	1541	1695	1864	2050	2256	2256	2256
Interest	0	0	0	342	506	684	891	1080	1080	940	786	617	430	225	0	0
Loan receipts (treecrop 5)	0	0	0	4197	1982	2297	2846	2940	11322	9854	8240	6464	4511	2362	0	0
Principal outstanding	0	0	0	4197	6180	8476	11322	11322	11322	11322	11322	11322	11322	11322	11322	11322
Debt service (treecrop 5)	0	0	0	0	420	618	848	1132	1132	2600	2600	2600	2600	2600	2600	2600
Principal	0	0	0	0	0	0	0	0	0	1468	1614	1776	1953	2149	2364	2364
Interest	0	0	0	0	420	618	848	1132	1132	1132	985	824	646	451	236	0
Total loan receipts	5429	3427	5777	8575	6389	5579	4737	2940	0	0	0	0	0	0	0	0
Total principal outstanding	5429	8857	14634	23209	29598	35177	38496	36048	31955	25986	19419	12197	6765	2362	0	0
Total long-term debt service	0	543	886	1463	2321	2960	4936	6297	7698	9165	9165	9165	9165	9165	9165	9165
Principal	0	0	0	0	0	0	1419	2448	4093	5970	6567	7223	5432	4404	2364	0
Interest	543	886	886	1463	2321	2960	3518	3850	3605	3196	2599	1942	1220	677	236	0
Net long-term financing	5429	2884	4891	7112	4068	2619	-200	-3357	-7698	-9165	-9165	-9165	-6652	-5081	-2600	0
Net Benefit After Financing	0	6931	10913	11782	12524	-851	-1558	-2450	2987	6246	9418	10357	12870	14441	16922	28480
Accumulative Balance	0	6931	17844	29656	42150	41300	39732	37282	40269	46515	55933	66290	79160	93601	110524	139004
NPV (12%)	553,596															

Crop name followed by a number indicates the project Year in which the crop was planted.

**Table A3.17: Financial analysis of Farm Model Type 5 participation in the project (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>INVESTMENTS</b>																
<b>Overall Farm Investments</b>																
Bow saw		30						30								
Hand pruning saw		62						62								
Knapsac sprayer		674						674								
Mist blower		652						652								
Weekender		1367						1367								
Fork		178						178								
Spade		83						83								
File		17						17								
Cutlass		22						22								
Secateurs		56						56								
Field crate		750						750								
<b>Total overall farm Investments</b>	0	3890	0	0	0	0	0	3890	0	0	0	0	0	0	0	0
<b>Enterprise investment costs</b>																
Avocado 2	0	703	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mango 2	0	1496	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 3	0	0	703	0	0	0	0	0	0	0	0	0	0	0	0	0
Mango 3	0	0	2244	0	0	0	0	0	0	0	0	0	0	0	0	0
Soursop 3	0	0	1129	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 4	0	0	0	703	0	0	0	0	0	0	0	0	0	0	0	0
Mango 4	0	0	0	2992	0	0	0	0	0	0	0	0	0	0	0	0
Soursop 4	0	0	0	1129	0	0	0	0	0	0	0	0	0	0	0	0
Mango 5	0	0	0	0	2244	0	0	0	0	0	0	0	0	0	0	0
Sapodilla	0	0	0	0	1405	0	0	0	0	0	0	0	0	0	0	0
Breadfruit 5	0	0	0	0	703	0	0	0	0	0	0	0	0	0	0	0
<b>Total enterprise investment costs</b>	0	2199	4075	-823	4352	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL FARM INVESTMENT</b>	0	6089	4075	-823	4352	0	0	3890	0	0	0	0	0	0	0	0

Crop name followed by a number indicates the project Year in which the crop was planted.

Table A3.17 (Continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Enterprise operating costs</b>																
Avocado 2	0	1014	429	459	453	528	571	603	632	632	623	623	623	623	623	623
Mango 2	0	2407	1210	1322	1620	1363	1589	1707	1753	1753	1753	1753	1753	1753	1753	1753
Pawpaw 2	0	2534	960	0	0	0	0	0	0	0	0	0	0	0	0	0
Hoppepper 2	0	1429	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 3	0	0	1014	429	459	453	528	571	603	632	632	623	623	623	623	623
Mango 3	0	0	3611	1815	1983	2430	2044	2383	2560	2629	2629	2629	2629	2629	2629	2629
Sourpaw 3	0	0	1915	919	1180	1416	1422	1475	1525	1525	1525	1525	1525	1525	1525	1525
Pawpaw 3	0	0	2534	960	0	0	0	0	0	0	0	0	0	0	0	0
Hoppepper 3	0	0	2859	960	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 3	0	0	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 4	0	0	0	1014	429	459	453	528	571	603	632	632	623	623	623	623
Mango 4	0	0	0	4815	2419	2644	3240	2726	3178	3413	3506	3506	3506	3506	3506	3506
Sourpaw 4	0	0	0	1915	919	1180	1416	1422	1475	1525	1525	1525	1525	1525	1525	1525
Pawpaw 4	0	0	0	2534	960	0	0	0	0	0	0	0	0	0	0	0
Hoppepper 4	0	0	0	4288	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 4	0	0	0	4027	0	0	0	0	0	0	0	0	0	0	0	0
Mango 5	0	0	0	0	3611	1815	1983	2430	2044	2383	2560	2629	2629	2629	2629	2629
Sapodilla 5	0	0	0	0	2158	918	911	1240	1674	1761	1848	1857	1857	1857	1857	1857
Breadfruit 5	0	0	0	0	1103	513	742	969	685	765	871	871	871	871	871	871
Pawpaw 5	0	0	0	0	5068	1919	0	0	0	0	0	0	0	0	0	0
Hoppepper 5	0	0	0	0	5717	0	0	0	0	0	0	0	0	0	0	0
Sorrel 5	0	0	0	0	4027	0	0	0	0	0	0	0	0	0	0	0
Equipment rental/maintenance	0	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
<b>Total enterprise operating costs</b>	0	5186	12769	19971	28054	15937	15200	16333	16999	17922	18404	18473	18464	18464	18464	18464
<b>Intercrops</b>																
Year 2 establishment	0	1223	4103	7863	11982	13718	14900	16053	16699	17622	18104	18173	18164	18164	18164	18164
Year 3 establishment	0	1638	1781	2073	1891	2160	2310	2385	2385	2376	2376	2376	2376	2376	2376	2376
Year 4 establishment	0	2465	3162	3622	4299	4676	4688	4786	4777	4777	4777	4777	4777	4777	4777	4777
Year 5 establishment	0	0	2920	2920	3767	4283	5109	5654	5541	5541	5654	5654	5654	5654	5654	5654
Year 5 establishment	0	0	0	0	2521	3245	3656	4658	4403	4909	5279	5357	5357	5357	5357	5357
<b>Incremental working capital</b>																
Intercrops	3963	4402	3443	3963	-13852	-1919	0	0	0	0	0	0	0	0	0	0
Treecrops	7312	866	4508	3648	-2616	1181	1153	646	923	482	69	-9	0	0	0	0
Year 2 establishment	0	-5674	143	292	-182	269	150	75	0	-9	0	0	0	0	0	0
Year 3 establishment	0	6540	-3378	460	677	-305	-435	259	98	0	-9	0	0	0	0	0
Year 4 establishment	0	0	7743	460	516	826	-433	548	318	121	0	-9	0	0	0	0
Year 5 establishment	0	0	0	6872	-3627	391	1002	-235	507	369	79	0	0	0	0	0
<b>TOTAL OUTFLOW</b>	11275	16544	24794	32406	15937	15200	16333	20890	17922	18404	18473	18464	18464	18464	18464	18464

Crop name followed by a number indicates the project Year in which the crop was planted.

Table A3.17 (Continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>INFLOW</b>																
Farm Production																
Avocado 2	0	0	0	243	576	864	2340	3240	3960	3960	3960	3960	3960	3960	3960	3960
Mango 2	0	6080	3040	0	365	912	3040	3420	4560	4560	4560	4560	4560	4560	4560	4560
Pawpaw 2	0	7400	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hotpepper 2	0	0	0	0	0	0	864	2340	3240	3960	3960	3960	3960	3960	3960	3960
Avocado 3	0	0	0	0	243	576	864	2340	3240	3960	3960	3960	3960	3960	3960	3960
Mango 3	0	0	0	0	0	547	1368	4560	5130	6840	6840	6840	6840	6840	6840	6840
Soursop 3	0	0	0	0	1080	2160	2700	3240	3600	3960	3960	3960	3960	3960	3960	3960
Pawpaw 3	0	0	6080	3040	0	0	0	0	0	0	0	0	0	0	0	0
Hotpepper 3	0	0	14800	0	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 3	0	0	8880	0	0	0	0	0	0	0	0	0	0	0	0	0
Avocado 4	0	0	0	0	0	243	576	864	2340	3240	3960	3960	3960	3960	3960	3960
Mango 4	0	0	0	0	0	0	730	1824	6080	6840	9120	9120	9120	9120	9120	9120
Soursop 4	0	0	0	0	0	1080	2160	2700	3240	3600	3960	3960	3960	3960	3960	3960
Pawpaw 4	0	0	0	6080	3040	0	0	0	0	0	0	0	0	0	0	0
Hotpepper 4	0	0	0	22200	0	0	0	0	0	0	0	0	0	0	0	0
Sorrel 4	0	0	0	17760	0	0	0	0	0	0	0	0	0	0	0	0
Mango 5	0	0	0	0	0	0	0	547	1368	4560	5130	6840	6840	6840	6840	6840
Soursop 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sapodilla 5	0	0	0	0	0	0	520	2080	3120	4680	6240	6240	6240	6240	6240	6240
Breadfruit 5	0	0	0	0	0	0	192	960	1200	2000	2240	2240	2240	2240	2240	2240
Pawpaw 5	0	0	0	0	12160	6080	0	0	0	0	0	0	0	0	0	0
Hotpepper 5	0	0	0	0	29600	0	0	0	0	0	0	0	0	0	0	0
Sorrel 5	0	0	0	0	17760	0	0	0	0	0	0	0	0	0	0	0
Total farm production	0	13480	32800	-9323	64824	12462	14490	25775	37838	-48200	53930	55640	55640	55640	55640	55640
<b>Residual Value</b>																
Intercrop																18164
Tree crops																73804
<b>TOTAL INFLOW</b>	0	13480	32800	-9323	64824	12462	14490	25775	37838	-48200	53930	55640	55640	55640	55640	73804
Net benefit before financing																
NPV (12%)	-11275	-3064	8006	16917	-48886	-2738	-1863	4885	19916	29796	35457	37176	37176	37176	37176	55340
IRR	69%															

Crop name followed by a number indicates the project Year in which the crop was planted.

Table A3.17 (Continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>FINANCING</b>																
Short-term loan receipts	3963	8366	11808	15772	1919	0	0	0	0	0	0	0	0	0	0	0
Debt service (short-term)	4360	9202	9202	12989	17349	2111	0	0	0	0	0	0	0	0	0	0
Interest payments (short term)	0	396	837	1181	1577	192	0	0	0	0	0	0	0	0	0	0
Net short term financing	3963	4006	2606	2783	-15430	-2111	0	0	0	0	0	0	0	0	0	0
Net benefit after short financing	-7312	942	10612	19700	33437	-4849	-1863	4885	19916	29796	35437	37176	37176	37176	37176	55340
<b>Long term financing</b>																
Loan receipts (treecrop 2)	7312	1638	1781	2073	1891	0	0	0	0	0	0	0	0	0	0	0
Principal outstanding	7312	8950	10731	12804	14695	14695	12790	10695	8390	5855	3066	0	0	0	0	0
Debt service (treecrop 2)	731	731	895	1073	1280	1470	3374	3374	3374	3374	3374	3374	3374	3374	3374	3374
Principal	0	0	0	0	0	0	1905	2095	2305	2535	2789	3068	0	0	0	0
Interest	731	731	895	1073	1280	1470	1470	1279	1069	839	585	307	0	0	0	0
Loan receipts (treecrop 3)	6540	6540	3162	3622	4299	3994	21617	18815	15733	12342	8613	4510	0	0	0	0
Principal outstanding	6540	6540	9702	13323	17622	21617	2162	4964	4964	4964	4964	4964	4964	4964	4964	4964
Debt service (treecrop 3)	654	654	654	970	1332	1762	2162	2802	3082	3390	3729	4102	4513	4513	4513	4513
Principal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest	654	654	654	970	1332	1762	2162	2162	1881	1573	1234	861	451	0	0	0
Loan receipts (treecrop 4)	0	0	7743	3767	4283	5109	4676	25578	22263	18616	14604	10191	5337	0	0	0
Principal outstanding	0	0	7743	11510	15793	20902	25578	25578	5873	5873	5873	5873	5873	5873	5873	5873
Debt service (treecrop 4)	0	0	0	774	1151	1579	2090	2558	3315	3647	4012	4413	4854	5340	5340	5340
Principal	0	0	0	774	1151	1579	2090	2558	2558	2226	1862	1460	1019	534	0	0
Interest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Loan receipts (treecrop 5)	0	0	0	6872	3245	3636	4638	4403	18392	16008	13386	10501	7328	3837	0	0
Principal outstanding	0	0	0	6872	10118	13754	18392	18392	4223	4223	4223	4223	4223	4223	4223	4223
Debt service (treecrop 5)	0	0	0	0	687	1012	1375	1839	1839	2284	2622	2885	3173	3490	3839	3839
Principal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest	0	0	0	0	687	1012	1375	1839	1839	1839	1601	1339	1050	733	384	384
Total loan receipts	7312	8178	12686	16334	13718	12740	9314	4403	0	0	0	0	0	0	0	0
Total principal outstanding	7312	15490	28176	44510	58228	70968	78377	73480	64777	52821	39668	25202	12665	3837	0	0
Total long-term debt service	0	731	1549	2818	4451	5823	9002	12735	16030	18434	18434	18434	15060	10096	4223	4223
Principal	0	0	0	0	0	0	1905	4897	8702	11957	13152	14468	12540	8830	3839	3839
Interests	731	731	1549	2818	4451	5823	7097	7838	7348	6478	5282	3967	2520	1266	384	384
Net long-term financing	7312	7447	11137	13516	9267	6917	312	-8332	-16050	-18434	-18434	-18434	-15060	-10096	-4223	0
Net Benefit After Financing	0	8389	21749	33216	42724	2068	-1531	-3447	3866	11362	17023	18742	22116	27080	32953	55340
Accumulative Balance	0	8389	30138	63354	106078	108146	106595	103148	107014	118376	135399	154141	176257	203336	236289	291629
NPV (12%)	\$119,714															

Crop name followed by a number indicates the project Year in which the crop was planted.

**Table A3.18: Farm Models financial viability with yields 80% of expected yields (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Farm model 1</b>																
Net benefit before financing	0	-3445	2838	4000	-885	-610	-505	-736	417	873	873	873	873	873	873	1824
Net benefit after financing	0	0	3174	3106	-364	-1063	-957	-1775	-623	-167	-167	-167	-167	873	873	1824
Accumulative balance	0	0	3174	6279	5915	4851	3894	2119	1495	1328	1161	994	827	1699	2572	4396
NPV before financing	\$2,487															
IRR before financing	45%															
<b>Farm model 2</b>																
Net benefit before financing	0	-5991	4186	4555	-1695	-1146	-934	-373	908	1820	1820	1820	1820	1820	1820	3648
Net benefit after financing	0	0	4084	3605	-619	-1934	-1722	-2183	-902	10	10	10	10	1820	1820	3648
Accumulative balance	0	0	4084	7689	7070	5136	3414	1231	329	339	349	359	369	2189	4009	7657
NPV before financing	\$2,916															
IRR before financing	25%															
<b>Farm model 3</b>																
Net benefit before financing	-4665	-1979	3483	8107	2527	-2719	-1249	-1486	3412	5144	6176	6185	6185	6185	6185	10314
Net benefit after financing	0	3052	7035	7314	2709	-1807	-2820	-5414	-1403	329	1361	1370	2795	4614	6185	10314
Accumulative balance	0	3052	10086	17400	20109	18303	15483	10069	8666	8995	10356	11726	14521	19135	25320	35634
NPV before financing	\$14,027															
IRR before financing	38%															
<b>Farm model 4</b>																
Net benefit before financing	-8126	742	1893	847	9705	-3405	-2696	-1581	6764	10499	13033	13786	13786	13786	13786	22744
Net benefit after financing	0	-4843	7633	7894	8211	-1841	-2896	-4938	-934	1334	3868	4621	7134	8705	11186	22744
Accumulative balance	0	-4843	12476	20370	28581	26739	23843	18906	17972	19306	23174	27795	34929	43634	54820	77564
NPV before financing	\$25,155															
IRR before financing	32%															
<b>Farm model 5</b>																
Net benefit before financing	-11275	-5760	1446	7053	35922	-5230	-4761	-270	12348	20156	24671	26048	26048	26048	26048	44212
Net benefit after financing	0	5693	15189	23352	29759	-424	-4449	-8602	-3702	1722	6237	7614	10988	15952	21825	44212
Accumulative balance	0	5693	20882	44234	73993	73569	69120	60518	56816	58538	64774	72388	83376	99328	121153	165365
NPV before financing	\$60,832															
IRR before financing	40%															

**Table A3.19: Farm models financial viability with farm gate price 80% of their expected levels (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Farm model 1</b>																
Net benefit before financing	0	-3445	2838	4000	-885	-610	-505	-736	417	873	873	873	873	873	873	1824
Net benefit after financing	0	0	3174	3106	-364	-1063	-957	-1775	-623	-167	-167	-167	-167	-167	-167	1824
Accumulative balance	0	0	3174	6279	5915	4851	3894	2119	1495	1328	1161	994	827	699	2572	4396
NPV before financing	\$2,487															
IRR before financing	45%															
<b>Farm model 2</b>																
Net benefit before financing	0	-5991	4186	4355	-1695	-1146	-934	-373	908	1820	1820	1820	1820	1820	1820	3648
Net benefit after financing	0	0	4084	3605	-619	-1934	-1722	-2183	-902	10	10	10	10	10	10	3648
Accumulative balance	0	0	4084	7689	7070	5136	3414	1231	329	339	349	359	369	2189	4009	7657
NPV before financing	\$2,916															
IRR before financing	25%															
<b>Farm model 3</b>																
Net benefit before financing	-465	-1979	3483	8107	2327	-2719	-1249	-1486	3412	5144	6176	6185	6185	6185	6185	10314
Net benefit after financing	0	3052	7035	7314	2709	-1807	-2820	-5414	-1403	329	1361	1370	2795	4614	6185	10314
Accumulative balance	0	3052	10086	17400	20109	18303	15483	10069	8666	8995	10356	11726	14521	19135	25320	35634
NPV before financing	\$14,027															
IRR before financing	38%															
<b>Farm model 4</b>																
Net benefit before financing	-8126	742	1893	847	9705	-3405	-2696	-1581	6764	10499	13033	13786	13786	13786	13786	22744
Net benefit after financing	0	4843	7633	7894	8211	-1841	-2896	-4938	-934	1334	3868	4621	7134	8705	11186	22744
Accumulative balance	0	4843	12476	20370	28581	26739	23843	18906	17972	19306	23174	27795	34929	43634	54820	77564
NPV before financing	\$25,155															
IRR before financing	32%															
<b>Farm model 5</b>																
Net benefit before financing	-11275	-5760	1446	7053	35922	-5230	-4761	-270	12348	20156	24671	26048	26048	26048	26048	44212
Net benefit after financing	0	5693	15189	23352	29759	-424	-4449	-8602	-3702	1722	6237	7614	10988	15952	21825	44212
Accumulative balance	0	5693	20882	44234	73993	73569	69120	60518	56816	58538	64774	72388	83376	99328	121153	165365
NPV before financing	\$60,832															
IRR before financing	40%															



**Table A3.20: Farm models financial viability with production costs 20% higher than expected (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Farm model 1</b>																
Net benefit before financing	0	-3929	3658	5052	-1047	-710	-572	-602	583	1153	1153	1153	1153	1153	1153	2280
Net benefit after financing	0	0	4065	3985	-414	-1229	-1091	-1793	-607	-37	-37	-37	-37	1153	1153	2280
Accumulative balance	0	0	4065	8051	7637	6408	5318	3525	2918	2881	2844	2807	2770	3923	5076	7356
NPV before financing	\$3,939															
IRR before financing	59%															
<b>Farm model 2</b>																
Net benefit before financing	0	-6969	5396	5778	-2019	-1346	-1070	-106	1241	2381	2381	2381	2381	2381	2381	4560
Net benefit after financing	0	0	5281	4648	-718	-2265	-1989	-2218	-870	270	270	270	270	2381	2381	4560
Accumulative balance	0	0	5281	9929	9211	6946	4957	2739	1870	2140	2410	2680	2950	5332	7713	12273
NPV before financing	\$4,844															
IRR before financing	32%															
<b>Farm model 3</b>																
Net benefit before financing	-5149	-2138	4804	10414	3367	-3191	-1341	-1061	4507	6674	7964	7976	7976	7976	7976	12930
Net benefit after financing	0	3944	9112	9508	3631	-2051	-3123	-5672	-1168	999	2289	2300	3907	6090	7976	12930
Accumulative balance	0	3944	13055	22563	26194	24143	21020	15348	14179	15179	17468	19769	23676	29765	37741	50671
NPV before financing	\$20,307															
IRR before financing	46%															
<b>Farm model 4</b>																
Net benefit before financing	-9147	1308	2928	1834	12549	-3848	-2930	-755	8941	13622	16789	17731	17731	17731	17731	28480
Net benefit after financing	0	6290	9876	10351	10816	-1911	-3031	-4645	-157	2762	5930	6871	9748	11634	14611	28480
Accumulative balance	0	6290	16166	26517	37333	35421	32391	27746	27589	30351	36281	43152	52900	64534	79144	107624
NPV before financing	\$36,098															
IRR before financing	38%															
<b>Farm model 5</b>																
Net benefit before financing	-12752	-6372	3107	10496	-4573	-5704	-5060	1545	16392	26176	31822	33543	33543	33543	33543	53340
Net benefit after financing	0	7449	19676	30133	38442	129	-4518	-8270	-2686	4243	9889	11610	15481	21437	28485	53340
Accumulative balance	0	7449	27125	57258	95700	95828	91311	83040	80354	84597	94486	106097	121578	143015	171500	226840
NPV before financing	\$84,714															
IRR before financing	47%															

**Table A3.21: Farm models financial viability with yields 80% of the expected level and production costs 20% higher than anticipated (Constant US\$).**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Farm model 1</b>																
Net benefit before financing	0	-3929	2474	3868	-1047	-747	-663	-906	241	697	697	697	697	697	697	1824
Net benefit after financing	0	0	2881	2801	-414	-1265	-1182	-2097	-949	-493	-493	-493	-493	-493	-493	1824
Accumulative balance	0	0	2881	5683	5269	4004	2822	725	-224	-717	-1210	-1703	-2196	-1499	-802	1022
NPV before financing	\$970															
IRR before financing	22%															
<b>Farm model 2</b>																
Net benefit before financing	0	-6969	3604	4290	-2019	-1419	-1252	-714	537	1469	1469	1469	1469	1469	1469	3648
Net benefit after financing	0	0	3489	3160	-718	-2338	-2171	-2826	-1554	-642	-642	-642	-642	-642	-642	3648
Accumulative balance	0	0	3489	6649	5931	3593	1422	-1404	-2958	-3600	-4241	-4883	-5525	-4035	-2586	1062
NPV before financing	(\$9)															
IRR before financing	12%															
<b>Farm model 3</b>																
Net benefit before financing	-5149	-3322	1828	7134	1843	-3403	-1980	-2275	2595	4316	5348	5360	5360	5360	5360	10314
Net benefit after financing	0	2760	6136	6228	2106	-2263	-3761	-6886	-3080	-1359	-327	-316	1291	3474	5360	10314
Accumulative balance	0	2760	8895	15123	17229	14966	11204	4318	1238	-121	-447	-763	528	4002	9362	19676
NPV before financing	\$7,080															
IRR before financing	22%															
<b>Farm model 4</b>																
Net benefit before financing	-9147	-780	-352	-2054	8236	-4839	-4258	-3243	5020	8710	11239	11995	11995	11995	11995	22744
Net benefit after financing	0	4202	6596	6463	6502	-2902	-4359	-7132	-4079	-2150	380	1135	4012	5898	8875	22744
Accumulative balance	0	4202	10798	17261	23763	20861	16502	9370	5291	3142	3522	4657	8669	14566	23441	46185
NPV before financing	\$11,950															
IRR before financing	20%															
<b>Farm model 5</b>																
Net benefit before financing	-12752	-9068	-3433	632	32808	-8196	-7958	-3610	8824	16536	21036	22415	22415	22415	22415	44212
Net benefit after financing	0	4753	13116	20268	25477	-2364	-7416	-13425	-10254	-5397	-897	482	4353	10309	17357	44212
Accumulative balance	0	4753	17869	38137	63614	61250	53835	40409	30156	24758	23862	24344	28697	39006	56364	100576
NPV before financing	\$33,681															
IRR before financing	24%															

**Table A3.22: Farm models financial viability with yields and farm gate price 80% of their expected levels (Constant US\$).**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Farm Model 1</b>																
Net benefit before financing	0	-3445	1891	3053	-885	-640	-578	-979	143	508	508	508	508	508	508	1459
Net benefit after financing	0	0	2226	2158	-364	-1092	-1030	-2019	-897	-532	-532	-532	-532	508	508	1459
Accumulative balance	0	0	2226	-4385	-4020	2928	1897	-121	-1018	-1550	-2082	-2614	-3146	-2638	-2130	-671
NPV before financing	\$111															
IRR before financing	13%															
<b>Farm model 2</b>																
Net benefit before financing	0	-5991	2752	3364	-1695	-1204	-1080	-859	361	1090	1090	1090	1090	1090	1090	2918
Net benefit after financing	0	0	2650	2415	-619	-1993	-1868	-2669	-1449	-720	-720	-720	-720	1090	1090	2918
Accumulative balance	0	0	2650	5065	4446	2454	586	-2084	-3533	-4253	-4972	-5692	-6411	-5521	-4230	-1312
NPV before financing	(\$967)															
IRR before financing	8%															
<b>Farm model 3</b>																
Net benefit before financing	-4665	-2927	1102	5483	1307	-2890	-1760	-2457	1883	3258	4083	4093	4093	4093	4093	8221
Net benefit after financing	0	2104	-4654	-4690	1489	-1977	-3330	-6385	-2933	-1537	-732	702	702	2521	4093	8221
Accumulative balance	0	2104	6758	11448	12938	10961	7630	1245	-1687	-3245	-3976	-4699	-3997	-1476	2617	10838
NPV before financing	\$3,445															
IRR before financing	17%															
<b>Farm model 4</b>																
Net benefit before financing	-8126	-929	-731	-2263	6255	-4198	-3759	-3571	3627	6570	8593	9197	9197	9197	9197	18155
Net benefit after financing	0	3173	5009	-4783	4760	-2634	-3938	-6928	-4071	-2595	-572	32	2545	4117	6598	18155
Accumulative balance	0	3173	8182	12965	17725	15091	11133	4205	134	-2461	-3034	-3001	-456	3660	10258	28413
NPV before financing	\$5,837															
IRR before financing	16%															
<b>Farm model 5</b>																
Net benefit before financing	-11275	-7916	-3802	-839	25550	-7224	-7080	-4394	6294	12444	16042	17146	17146	17146	17146	35310
Net benefit after financing	0	3536	9941	15460	19387	-2418	-6767	-12726	-9756	-5990	-2392	-1289	2086	7049	12923	35310
Accumulative balance	0	3536	13477	28937	48324	45906	39139	26413	16637	10667	8275	6986	9072	16121	29044	64354
NPV before financing	\$20,006															
IRR before financing	21%															

**Table A3.23: Farm models financial viability with yields and farmgate prices 80% of expected levels and production cost 20% higher than expected (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Farm model 1</b>																
Net benefit before financing	0	-3929	1526	2920	-1047	-776	-736	-1150	-32	332	332	332	332	332	332	1459
Net benefit after financing	0	0	1934	1854	-414	-1294	-1255	-2340	-1223	-858	-858	-858	-858	-858	-858	1459
Accumulative balance	0	0	1934	3788	3375	2080	826	-1514	-2737	-3595	-4453	-5311	-6169	-5836	-5504	-4045
NPV before financing	<b>(\$1,406)</b>															
IRR before financing	<b>1%</b>															
<b>Farm model 2</b>																
Net benefit before financing	0	-6969	2170	3100	-2019	-1477	-1398	-1201	10	740	740	740	740	740	740	2918
Net benefit after financing	0	0	2055	1969	-718	-2396	-2317	-3312	-2101	-1371	-1371	-1371	-1371	-1371	-1371	2918
Accumulative balance	0	0	2055	4025	3307	911	-1407	-4719	-6820	-8191	-9562	-10934	-12305	-11565	-10825	-7907
NPV before financing	<b>(\$3,892)</b>															
IRR before financing	<b>-1%</b>															
<b>Farm model 3</b>																
Net benefit before financing	-5149	-4270	-552	4510	623	-3574	-2490	-3247	1065	2430	3256	3267	3267	3267	3267	8221
Net benefit after financing	0	1812	3755	3604	887	-2434	-4272	-7857	-4610	-3245	-2419	-2408	-802	1381	3267	8221
Accumulative balance	0	1812	5567	9171	10058	7624	3352	-4505	-9115	-12360	-14780	-17188	-17990	-16609	-13342	-5121
NPV before financing	<b>(\$3,502)</b>															
IRR before financing	<b>7%</b>															
<b>Farm model 4</b>																
Net benefit before financing	-9147	-2451	-2976	-5164	4785	-5631	-5321	-5233	1883	4780	6799	7406	7406	7406	7406	18155
Net benefit after financing	0	2531	3972	3352	3052	-3694	-5421	-9122	-7216	-6079	-4060	-3454	-577	1309	4286	18155
Accumulative balance	0	2531	6504	9856	12907	9213	3792	-5331	-12546	-18626	-22686	-26139	-26716	-25407	-21121	-2966
NPV before financing	<b>(\$7,368)</b>															
IRR before financing	<b>7%</b>															
<b>Farm model 5</b>																
Net benefit before financing	-12752	-11225	-8701	-7260	22436	-10190	-10276	-7734	2770	8824	12408	13513	13513	13513	13513	35310
Net benefit after financing	0	2596	7868	12377	15105	-4358	-9734	-17549	-16308	-13109	-9525	-8420	-4549	1407	8455	35310
Accumulative balance	0	2596	10464	22841	37946	33588	23854	6305	-10003	-23112	-32638	-41058	-45607	-44200	-35745	-436
NPV before financing	<b>(\$7,145)</b>															
IRR before financing	<b>10%</b>															

**Table A3.24: Financial analysis of the Marketing and National Import Board participation in the project (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Investment</b>																
Packing line	29000															
Gas operated drier	28000															
Double manifold pump system	3800															
500 field crates	30000															
4 Ethylene extractors	400															
Staple machine	500															
Shipping and Insurance Costs	8500															
System design and installation	10000															
Solar dryers	20000															
<b>Total investment</b>	<b>130200</b>															
<b>Operating costs</b>																
<b>Avocado</b>																
Purchase of avocado	0	0	0	2430	13050	39285	81000	150120	265500	336600	376200	376200	376200	376200	376200	376200
Transport cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Packing material	0	0	0	999	5365	16151	33300	61716	109150	138380	154660	154660	154660	154660	154660	154660
Processing/marketing costs	0	0	0	270	1450	4365	9000	16680	29500	37400	41800	41800	41800	41800	41800	41800
Transport to port	0	0	0	135	725	2183	4500	8340	14750	18700	20900	20900	20900	20900	20900	20900
<b>Marketing of Avocado</b>																
<b>Total avocado costs</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1404</b>	<b>7540</b>	<b>22698</b>	<b>46800</b>	<b>86736</b>	<b>153400</b>	<b>194480</b>	<b>217360</b>	<b>217360</b>	<b>217360</b>	<b>217360</b>	<b>217360</b>	<b>217360</b>
<b>Mango</b>																
Purchase of mango	0	0	0	0	15504	75240	239552	506350	718200	905350	974700	1003200	1003200	1003200	1003200	1003200
Transport cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Packing material	0	0	0	0	12077	58608	186598	394420	599440	705220	759240	781440	781440	781440	781440	781440
Processing/marketing	0	0	0	0	2274	6821	14779	21600	25768	29558	31832	33347	33347	33347	33347	33347
Transport to port	0	0	0	0	1137	3411	7389	10800	12884	14779	15916	16674	16674	16674	16674	16674
<b>Marketing of Mango</b>																
<b>Total mango costs</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>30991</b>	<b>144080</b>	<b>448319</b>	<b>933170</b>	<b>1316293</b>	<b>1654907</b>	<b>1781687</b>	<b>1834661</b>	<b>1834661</b>	<b>1834661</b>	<b>1834661</b>	<b>1834661</b>
<b>Soursop</b>																
Purchase of soursop	0	0	0	0	10800	32400	70200	102600	122400	140400	151200	158400	158400	158400	158400	158400
Transport cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Packing material	0	0	0	0	4020	12060	26130	38190	45560	52260	56280	58960	58960	58960	58960	58960
Processing/marketing costs	0	0	0	0	2400	7200	15600	22800	27200	31200	33600	35200	35200	35200	35200	35200
Transport to port	0	0	0	0	1200	3600	7800	11400	13600	15600	16800	17600	17600	17600	17600	17600
<b>Soursop Marketing costs</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7620</b>	<b>22860</b>	<b>49530</b>	<b>72390</b>	<b>86360</b>	<b>99060</b>	<b>106680</b>	<b>111760</b>	<b>111760</b>	<b>111760</b>	<b>111760</b>	<b>111760</b>
<b>Total soursop costs</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>18420</b>	<b>55260</b>	<b>119730</b>	<b>174990</b>	<b>208760</b>	<b>239460</b>	<b>257880</b>	<b>270160</b>	<b>270160</b>	<b>270160</b>	<b>270160</b>	<b>270160</b>

Table A3.2.4 (continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Sapodilla</b>																
Purchase of sapodilla	0	0	0	0	0	0	10400	41600	62400	93600	124800	124800	124800	124800	124800	124800
Transport cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Packing material	0	0	0	0	0	0	5920	23680	35520	53280	71040	71040	71040	71040	71040	71040
Processing marketing costs	0	0	0	0	0	0	1600	6400	9600	14400	19200	19200	19200	19200	19200	19200
Transport to port	0	0	0	0	0	0	800	3200	4800	7200	9600	9600	9600	9600	9600	9600
Sapodilla marketing costs	0	0	0	0	0	0	8320	33280	49920	74880	99840	99840	99840	99840	99840	99840
Total sapodilla costs	0	0	0	0	0	0	18720	74880	112320	168480	224640	224640	224640	224640	224640	224640
<b>Breadfruit</b>																
Purchase of breadfruit	0	0	0	0	0	0	1920	9600	12000	20000	22400	22400	22400	22400	22400	22400
Transport cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Packing material	0	0	0	0	0	0	1416	7080	8850	14750	16520	16520	16520	16520	16520	16520
Processing marketing costs	0	0	0	0	0	0	960	4800	6000	10000	11200	11200	11200	11200	11200	11200
Transport to port	0	0	0	0	0	0	480	2400	3000	5000	5600	5600	5600	5600	5600	5600
Breadfruit Marketing costs	0	0	0	0	0	0	2856	14280	17850	29750	33320	33320	33320	33320	33320	33320
Total breadfruit costs	0	0	0	0	0	0	4776	23880	29850	49750	55720	55720	55720	55720	55720	55720
<b>Pawpaw</b>																
Purchase of Pawpaw	0	121600	349600	402800	372400	121600	0	0	0	0	0	0	0	0	0	0
Transport cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Packing material	0	42880	123280	142040	131320	42880	0	0	0	0	0	0	0	0	0	0
Processing marketing costs	0	25600	73600	84800	78400	25600	0	0	0	0	0	0	0	0	0	0
Transport to port	0	12800	36800	42400	39200	12800	0	0	0	0	0	0	0	0	0	0
Pawpaw marketing costs	0	81280	233680	269240	248920	81280	0	0	0	0	0	0	0	0	0	0
Total pawpaw costs	0	202880	583280	672040	621320	202880	0	0	0	0	0	0	0	0	0	0
<b>Hot pepper</b>																
Purchase of hotpepper	0	314500	740000	814000	536500	0	0	0	0	0	0	0	0	0	0	0
Transport cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Packing material	0	125800	296000	325600	214600	0	0	0	0	0	0	0	0	0	0	0
Processing marketing costs	0	34000	80000	88000	58000	0	0	0	0	0	0	0	0	0	0	0
Transport to port	0	17000	40000	44000	29000	0	0	0	0	0	0	0	0	0	0	0
Hotpepper marketing costs	0	176800	416000	457600	301600	0	0	0	0	0	0	0	0	0	0	0
Total hot pepper costs	0	491300	1156000	1271600	838100	0	0	0	0	0	0	0	0	0	0	0

Table A3.24 (continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Sorrel</b>																
Purchase sorrel	0	55500	444000	532800	321900	0	0	0	0	0	0	0	0	0	0	0
Transport cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Packing material	0	11100	88800	106560	64380	0	0	0	0	0	0	0	0	0	0	0
Drying sorrel	0	3750	30000	36000	21750	0	0	0	0	0	0	0	0	0	0	0
Processing/marketing costs	0	3000	24000	28800	17400	0	0	0	0	0	0	0	0	0	0	0
Transport to port	0	1500	12000	14400	8700	0	0	0	0	0	0	0	0	0	0	0
Sorrel marketing costs	0	19350	154800	185760	112230	0	0	0	0	0	0	0	0	0	0	0
<b>Total sorrel costs</b>	0	19350	154800	185760	112230	0	0	0	0	0	0	0	0	0	0	0
<b>Total operating costs</b>	0	523450	1347600	1503594	1059531	274123	719345	1443776	2086123	2643677	2913487	2978741	2978741	2978741	2978741	2978741
<b>Total marketing board costs</b>	130200	523450	1347600	1503594	1059531	274123	719345	1443776	2086123	2643677	2913487	2978741	2978741	2978741	2978741	2978741
<b>Marketing Board revenue</b>																
Sale of avocado	0	0	0	3713	19938	60019	123750	229350	405625	514250	574750	574750	574750	574750	574750	574750
Sale of mango	0	0	0	0	36720	178200	567360	1199250	1701000	2144250	2308500	2376000	2376000	2376000	2376000	2376000
Sale of soursoop	0	0	0	0	27000	81000	175500	256500	306000	351000	378000	396000	396000	396000	396000	396000
Sapodilla	0	0	0	0	0	0	16000	64000	96000	144000	192000	192000	192000	192000	192000	192000
Breadfruit	0	0	0	0	0	0	8400	42000	52500	87500	98000	98000	98000	98000	98000	98000
Sale of pawpaw	0	320000	920000	1060000	980000	320000	0	0	0	0	0	0	0	0	0	0
Sale of passionfruit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sale of hotpepper	0	552500	1300000	1430000	942500	0	0	0	0	0	0	0	0	0	0	0
Sale of sorrel	0	79500	636000	763200	461100	0	0	0	0	0	0	0	0	0	0	0
<b>Total marketing Board revenue</b>	952000	2856000	3256913	2467258	639219	891010	1791100	2561125	3241000	3551250	3636750	3636750	3636750	3636750	3636750	3636750
<b>Net Marketing Board revenue</b>	-130200	428550	1508400	1753319	1407726	365096	171665	347324	475002	597323	637763	658009	658009	658009	658009	658009
<b>NPV (12%)</b>																
<b>IRR</b>																
<b>NET CROP MARKETING COST</b>																
Avocado	0	0	0	-122	-653	-1964	-4050	-7506	-13275	-16830	-18810	-18810	-18810	-18810	-18810	-18810
Mango	0	0	0	0	5729	34120	119041	266080	384707	489343	526813	541339	541339	541339	541339	541339
Soursoop	0	0	0	0	8580	25740	55770	81510	97240	111540	120120	125840	125840	125840	125840	125840
Sapodilla	0	0	0	0	0	0	-2720	-10880	-16320	-24480	-32640	-32640	-32640	-32640	-32640	-32640
Breadfruit	0	0	0	0	0	0	3624	18120	22650	37750	42280	42280	42280	42280	42280	42280
Pawpaw	0	117120	336720	387960	358680	117120	0	0	0	0	0	0	0	0	0	0
Passion fruit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hot pepper	0	61200	144000	158400	104400	0	0	0	0	0	0	0	0	0	0	0
Sorrel	0	60150	481200	577440	348870	0	0	0	0	0	0	0	0	0	0	0

Table A3.26: Financial viability of the project (Constant US\$)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>PROJECT ANALYSIS</b>																
<b>INVESTMENT COSTS</b>																
<b>Propagation Station</b>																
Land rover	28500															
Store room	3200															
Office	10500															
Sprinkler irrigation system	3000															
Concreting saran shed area	17200															
Concrete water tank	3000															
Saran material	6667															
Access road to holding area	7000															
Concreting distribution area	23508															
Installation labour costs	20000															
Bobcat	26000															
Office equipment	13800															
<b>Total Propagation station</b>	162375															
<b>PFU investment</b>	25000															
<b>Total MINIB Investment</b>	130200															
<b>Contingencies (5%)</b>	15879															
<b>TOTAL INVESTMENT</b>	<b>333453</b>															
<b>Overall project operating costs</b>																
Project manager	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
Field agronomists (3)	40000	40000	40000	40000	40000	40000	40000	40000	40000	40000	40000	40000	40000	40000	40000	40000
Post harvest specialist	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000
Administrative secretary	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
General propagation support staff (8)	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Vehicle maintenance	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Training	6000	10000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Communication	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Driver	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
Propagation supplies	16500	39500	27800	19200	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
General office supplies	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Monitoring and evaluation	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Consultant		20000														
Product promotion	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750
Travel and per diem	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Contingencies (5%)	8738	11088	9303	8873	8413	6413	3928	3878	3878	3878	3878	3878	3878	3878	3878	3878
<b>Total project operating costs</b>	<b>183488</b>	<b>232838</b>	<b>195353</b>	<b>186323</b>	<b>176663</b>	<b>134663</b>	<b>82478</b>	<b>81428</b>	<b>81428</b>	<b>81428</b>	<b>81428</b>	<b>81428</b>	<b>81428</b>	<b>81428</b>	<b>81428</b>	<b>81428</b>



Table A3.25 (continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>Farm production costs</b>																
Farm model 1 costs	0	0	137804	75913	29443	35401	30256	34775	78067	38058	38058	38058	38058	38058	38058	38058
Farm model 2 costs	0	0	104148	89474	41915	50852	43135	49913	53449	54838	54838	54838	54838	54838	54838	54838
Farm model 3 costs	0	116619	171633	210333	125334	89279	89259	151115	102468	105898	107199	107199	106967	106967	106967	106967
Farm model 4 costs	0	162516	152205	228537	294095	150976	147359	220619	170198	178420	182973	183343	183158	183158	183158	183158
Farm model 5 costs	0	112754	168436	247943	324056	159375	151997	202435	169994	179220	184036	184730	184638	184638	184638	184638
<b>Total Farm costs</b>	0	391889	734225	852401	814844	485883	462006	658857	574175	556433	567103	568168	567659	567659	567659	567659
<b>Marketing costs</b>	0	277430	804480	914004	693397	195678	316273	633506	905623	1147727	1264187	1293741	1293741	1293741	1293741	1293741
<b>Loan administration costs</b>	0	23513	64256	91765	114133	123515	139490	148525	136535	118345	95145	69624	41554	17858	5137	0
<b>TOTAL PROJECT COSTS</b>	516941	925670	1798314	2044493	1799036	939739	1000247	1522316	1697760	1903933	2007863	2012961	1984382	1960685	1958465	1942827
<b>PROJECT BENEFITS</b>																
<b>Sale of plants</b>																
Avocado		720	2160	3960	0											
Mango		8925	21000	11025	5250											
Soursop		0	3600	3600	7200											
Cashew		0	0	0	2880											
Breadfruit		0	0	0	720											
Pawpaw		38000	96000	68000	48000											
Passion fruit		0	0	0	0											
<b>Total sale of plants</b>	0	47645	122760	86585	64050	0	0	0	0	0	0	0	0	0	0	0
<b>Sale of fruits</b>																
Avocado	0	0	0	3713	19938	60019	123750	229350	405625	514250	574750	574750	574750	574750	574750	574750
Mango	0	0	0	0	36720	178200	567360	1199250	1701000	2144250	2308500	2376000	2376000	2376000	2376000	2376000
Soursop	0	0	0	0	10800	32400	70200	102600	122400	140400	151200	158400	158400	158400	158400	158400
Sapodilla	0	0	0	0	0	0	10400	41600	62400	93600	124800	124800	124800	124800	124800	124800
Breadfruit	0	0	0	0	0	0	1920	9600	12000	20000	22400	22400	22400	22400	22400	22400
Pawpaw	0	121600	349600	402800	372400	121600	0	0	0	0	0	0	0	0	0	0
Passion fruit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hot pepper	0	314500	740000	814000	536500	0	0	0	0	0	0	0	0	0	0	0
Sorrel	0	55500	444000	532800	321900	0	0	0	0	0	0	0	0	0	0	0
<b>Total sale of fruits</b>	0	491600	1533600	1753313	1298258	392219	773630	1582400	2303425	2912500	3181650	3256350	3256350	3256350	3256350	3256350
<b>Total Project Benefits</b>	0	539245	1656360	1839898	1362308	392219	773630	1582400	2303425	2912500	3181650	3256350	3256350	3256350	3256350	3256350
<b>Net Project Benefits</b>	-516941	-386425	-141954	-204596	-436729	-547520	-226617	60084	605665	1008567	1173787	1243389	1271968	1295665	1297885	1313523
<b>Accumulative Benefits</b>	-516941	-903365	-1043319	-1249915	-1686644	-2234163	-2460780	-2400696	-1795032	-786465	387323	1630711	2902680	4198345	5496230	6809753
<b>NPV</b>	5676,041;															
<b>IRR</b>	16%															

**Table A3.26: Economic viability of the project (Constant US\$)**

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
<b>INVESTMENT COSTS</b>																
Propagaton Station	28500															
Land rover	2746															
Store room	9009															
Office	3000															
Sprinkler irrigation system	14758															
Concreting saran shed area	2574															
Concrete water tank	6667															
Saran material	6006															
Access road to holding area	20170															
Concreting distribution area	20000															
Installation labour costs	26000															
Bobcat	13800															
Office equipment	153229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Propagation station																
PFU investment	25000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total MNIB Investment	130200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Contingencies (5%)	15421	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL INVESTMENT</b>	<b>323850</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Overall project operating costs</b>																
Project manager	20000	20000	20000	20000	20000	20000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000
Field agronomists (3)	40000	40000	40000	40000	40000	40000	13300	13300	13300	13300	13300	13300	13300	13300	13300	13300
Post harvest specialist	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000
Administrative secretary	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
General propagation support staff (8)	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000
Vehicle maintenance	3432	3432	3432	3432	3432	3432										
Vehicle insurance	1716	1716	1716	1716	1716	1716										
Training	6000	10000	6000	6000	6000	6000										
Communication	1287	1287	1287	1287	1287	1287	1287	500	500	500	500	500	500	500	500	500
Driver	4000	4000	4000	4000	4000	4000										
Propagation supplies	15675	37525	26410	18240	9500											
General office supplies	858	858	858	858	858	858	858	858	858	858	858	858	858	858	858	858
Monitoring and evaluation	2000	2000	2000	2000	2000	8000										
Consultant		20000														
Product promotion	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750	18750
Travel and per diem	2000	2000	2000	2000	2000	2000	3910	3870	3870	3870	3870	3870	3870	3870	4370	3870
Contingencies (5%)	8286	10578	8823	8414	7977	6345	82105	81278	81278	81278	81278	81278	81278	81278	91778	81278
<b>Total project operating costs</b>	<b>174004</b>	<b>222146</b>	<b>185276</b>	<b>176697</b>	<b>167520</b>	<b>133240</b>										

Table A3.26 (continued)

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	
<b>Farm production costs</b>																	
Farm model 1 costs			119874	64805	26061	31375	27119	30792	71828	33680	33680	33680	33680	33680	33680	34816	34816
Farm model 2 costs			89887	77299	36841	44812	38429	43938	47159	48271	48271	48271	48271	48271	48271	49975	49975
Farm model 3 costs	103888		145631	179808	108900	78424	78561	136514	89577	92569	93632	93632	93447	94157	95577	96287	
Farm model 4 costs	143820		129316	195326	251923	131940	128130	196700	149464	156477	160354	160650	160502	161638	162206	163342	
Farm model 5 costs	99556		143091	210404	276366	138915	132376	179761	149159	156960	161076	161631	161557	162125	162977	164113	
Total Farm costs	347264		627799	727641	700091	425465	404616	587705	507187	487957	497013	497865	497457	499871	505551	508533	
Marketing costs	277430		804480	914004	693397	195678	316273	633506	905623	1147727	1264187	1293741	1293741	1293741	1293741	1293741	
Loan administration costs	20836		55657	79056	98302	106768	120553	128303	117824	102021	81938	59846	35547	15182	4347	0	
<b>TOTAL PROJECT COSTS</b>	-497854	867676	1673212	1897398	1659310	861150	923546	1430793	1611912	1818984	1924416	1932730	1908023	1890073	1895418	1883553	
<b>PROJECT BENEFITS</b>																	
<b>Sale of plants</b>																	
Avocado	618		1853	3398	0												
Mango	7658		18018	9459	4505												
Soursop	0		3089	3089	6178												
Cashew	0		0	0	2471												
Breadfruit	0		0	0	618												
Pawpaw	32604		82368	58344	41184												
Passion fruit	0		0	0	0												
Total sale of plants	0	-40879	105328	74290	54955	0	0	0	0	0	0	0	0	0	0	0	
<b>Sale of fruits</b>																	
Avocado	0	0	0	3713	19938	60019	123750	229350	405625	514250	574750	574750	574750	574750	574750	574750	
Mango	0	0	0	0	36720	178200	567360	1199250	1701000	2144250	2308500	2376000	2376000	2376000	2376000	2376000	
Soursop	0	0	0	0	10800	32400	70200	102600	122400	140400	151200	158400	158400	158400	158400	158400	
Sapodilla	0	0	0	0	0	0	10400	41600	62400	93600	124800	124800	124800	124800	124800	124800	
Breadfruit	0	0	0	0	0	0	1920	9600	12000	20000	22400	22400	22400	22400	22400	22400	
Pawpaw	0	121600	349600	-402800	372400	121600	0	0	0	0	0	0	0	0	0	0	
Passion fruit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hot pepper	0	314500	740000	814000	536500	0	0	0	0	0	0	0	0	0	0	0	
Sorrel	0	55500	444000	532800	321900	0	0	0	0	0	0	0	0	0	0	0	
Total sale of fruits	0	491600	1533600	1753313	1298258	392219	773630	1582400	2303425	2912500	3181650	3256350	3256350	3256350	3256350	3256350	
<b>Total Project Benefits</b>	0	532479	1638928	1827602	1353212	392219	773630	1582400	2303425	2912500	3181650	3256350	3256350	3256350	3256350	3256350	
<b>Net Project Benefits</b>	-497854	-335197	-34284	-69796	-306098	-468932	-149916	151607	691513	1093516	1257234	1323620	1348327	1366277	1360932	1372797	
<b>Accumulative Benefits</b>	-497854	-833051	-867335	-937130	-1243228	-1712160	-1862076	-1710469	-1018956	74560	1331794	2655414	4003741	5370018	6730950	8103747	
<b>NPV \$1,305,269;</b>																	
<b>IRR 20%</b>																	

Table A3.27: Resources required for implementing the project in Current US dollars

ITEMS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Production credit	391889	713279	518318	618714	530679	388064	292375	144637		
Short term	124012	272214	65895	56979						
Long term	267877	441066	452423	561734	530679	388064	292375	144637		
Total short term	519100									
Total long term	3078855									
Total Credit	3597955									
Propagation station	162375									
MNIB	130200									
PFL	25000									
Contingencies	15879									
Total Investment	333453									

Project Operating Costs	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Personal costs										
Project manager	20000	21008	22051	23148	24301	25478	26129	25316	26588	27907
Field agronomists	40000	42017	44101	46296	48603	50955	52828	54706	56584	58462
Post harvest specialist	18000	18908	19846	20833	21871	22930	24129	25316	26588	27907
Administrative secretary	8000	8403	8820	9259	9721	10191	10724	11252	11817	12403
Propagation support staff	30000	31513	33076	34722	36452	38177	39907	41632	43357	45082
Driver	5000	5252	5513	5787	6075	6369	6669	6975	7287	7605
Supplies										

FECHA DE DEVOLUCION	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	1406	1477	1550	1629	1709	1795	1887	1980	2078	2171
	703	739	775	814	855	898	943	990	1040	1091
	26371	27696	29070	30537	32051	33662	35377	37129	38981	40833
	5454	5727	6012	6315	6628	6961	7316	7688	8061	8444
	114525	120277	126244	132618	139192	146189	153637	161635	169288	177896
	144637									
	14525	120277	126244	132618	139192	146189	153637	161635	169288	177896
	159162	120277	126244	132618	139192	146189	153637	161635	169288	177896
	44637									
	14525	120277	126244	132618	139192	146189	153637	161635	169288	177896

## WHAT IS IICA?

The Inter-American Institute for Cooperation on Agriculture (IICA) is the specialized agency for agriculture of the inter-American system. The Institute was founded on October 7, 1942 when the Council of Directors of the Pan American Union approved the creation of the Inter-American Institute of Agricultural Sciences.

IICA was founded as an institution for agricultural research and graduate training in tropical agriculture. In response to changing needs in the hemisphere, the Institute gradually evolved into an agency for technical cooperation and institutional strengthening in the field of agriculture. These changes were officially recognized through the ratification of a new Convention on December 8, 1980. The Institute's purposes under the new Convention are to encourage, facilitate and support cooperation among the 32 Member States, so as to better promote agricultural development and rural well-being.

With its broader and more flexible mandate and a new structure to facilitate direct participation by the Member States in activities of the Inter-American Board of Agriculture and the Executive Committee, the Institute now has a geographic reach that allows it to respond to needs for technical cooperation in all of its Member States.

The contributions provided by the Member States and the ties IICA maintains with its twelve Permanent Observer Countries and numerous international organizations provide the Institute with channels to direct its human and financial resources in support of agricultural development throughout the Americas.

The 1987-1991 Medium Term Plan, the policy document that sets IICA's priorities, stresses the reactivation of the agricultural sector as the key to economic growth. In support of this policy, the Institute is placing special emphasis on the support and promotion of actions to modernize agricultural technology and strengthen the processes of regional and subregional integration.

In order to attain these goals, the Institute is concentrating its actions on the following five programs: Agricultural Policy Analysis and Planning; Technology Generation and Transfer; Organization and Management for Rural Development; Marketing and Agroindustry; and Animal Health and Plant Protection.

These fields of action reflect the needs and priorities established by the Member States and delimit the areas in which IICA concentrates its efforts and technical capacity. They are the focus of IICA's human and financial resource allocations and shape its relationship with other international organizations.

The Member States of IICA are: Antigua and Barbuda, Argentina, Barbados, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominica, the Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, the United States of America, Uruguay and Venezuela.

The Permanent Observer Countries of IICA are: Arab Republic of Egypt, Austria, Belgium, Federal Republic of Germany, France, Israel, Italy, Japan, Netherlands, Portugal, Republic of Korea and Spain.

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