R2RW

Feasibility Study for R2RW Plant Nursery Mont Pellier, St. James

ARD

Ridge to Reef Watershed Project

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FEASIBILITY STUDY FOR
R2RW PLANT NURSERY
MONT PELLIER, ST. JAMES

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Prepared for the

Government of Jamaica's
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And the

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Abbreviations

R2RW	Ridge to Reef Watershed Project
GRW	Great River Watershed
MINAG	Ministry of Agriculture
RADA	Rural Agricultural Development Authority
NGO	Non-Governmental Organization
CBO	Community-Based Organization
JEA	Jamaica Exporters Association

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EXECUTIVE SUMMARY

The Ridge to Reef Watershed Project (R2RW) is a 5–6 year project funded and implemented by USAID and the Government of Jamaica, with the overall objective of contributing to improved quality of key natural resources in areas of Jamaica that are both environmentally and economically significant, primarily in the Great River and Rio Grande Watersheds. R2RW seeks to establish a plant nursery at Montpelier, St, James, with the aid of local partners and donors, to support development of crop and forestry enterprises that will contribute to improving the economic well being of the people, and stability of the environment of the Great River Watershed.

Project Description

The proposed R2RW plant nursery will be one (1) hectare in size and will include the following elements:

- Shade House 1,003 sq. m. (0.25 acre)
- Screen House 201 sq. m. (2,160 sq. ft.)
- Open Seedling Area 0.71 hectare (1.75 acres)
- Potting Shed 27 sq. m. (288 sq. ft.)
- Store Room 13 sq. m. (144 sq. ft.)
- Irrigation System
- Misting Propagator
- Nursery Equipment
- Perimeter Fencing
- Internal Roadway

The crops targeted for the plant nursery include the following:

- Cabbage
- Cauliflower
- Lettuce
- Pak Choi
- Tomato
- Broccoli
- Hot Pepper
- Sweet Pepper
- Plantains
- Banana
- Yams
- Fruit Tree Crops
- Ornamentals
- Timber & Non-Timber Forest Species

The market for seedlings and planting material produced by the proposed R2RW plant nursery will be farmers in the Great River Watershed area and the four western parishes of St. James, Hanover, Westmoreland and St. Elizabeth.

Marketing Plan

The proposed R2RW plant nursery project will be based on the demand for the selected crops to be produced by farmers in the Great River Watershed and the western parishes of St. James, Hanover, Westmoreland and St. Elizabeth. The market for the selected crops include food processors, the hotel sector and the export market, in addition to local households.

The proposed R2RW plant nursery project will include a marketing programme to promote sales of seedlings and planting materials to farmers in the project area. The marketing plan will include the development of a sales brochure and flyers describing the supply and price lists of planting material by the nursery. Other elements in the marketing programme will include limited print media advertising, sales calls, and public relations. The proposed R2RW plant nursery also will seek to maximize collaboration with existing agencies with extension services and outreach capabilities, including the Ministry of Agriculture, RADA and the Jamaica Agricultural Society (JAS), the public awareness programme the overall R2RW project, and the Great River Watershed Management Committee Task Force on Production and Marketing, to increase awareness of the R2RW plant nursery and to encourage farmers to purchase seedlings and planting material from the project.

Management and Operational Plan

It is proposed that the R2RW plant nursery project will be established as company limited by share capital, with participation in ownership by eligible farmers groups and CBOs. Farm management will be provided under a cost-sharing arrangement with the Montpelier Citrus Company Limited.

10-Year Financial Plan

The total capital expenditure for the proposed R2RW plant nursery is estimated at US$100,055 (J$4,702,589). The main expenditure is for nursery construction which is estimated at US$43,293 (J$2,034,788), including the cost of a shade house at US$18,191 (J$854,988) and the proposed screen house at US$10,838 (J$509,400). The cost of irrigation equipment is estimated at US$4,427 (J$208,057), including the cost of a misting propagator. The cost of nursery materials and equipment is estimated at US$13,680 (J$642,955), including the cost of miscellaneous small tools and equipment. The budget for perimeter fencing is estimated at US$17,547 (J$824,691) and at US$5,106 (J$240,000) for internal roadway works. Provision is made for start-up marketing costs at US$1,617 (J$76,000), and for start-up development costs at US$1,064 (J$50,000). Working capital requirement is projected at US$7,644 (J$359,274). A contingency of US$4,401 (J$206,825) is included representing 5% of the capital cost items.

It is proposed that the total capital expenditure costs will be financed by funding of US$56,078 (J$2,635,670) or 56.05% of the total project cost from the USAID R2RW budget committed to the proposed R2RW plant nursery, and by new funding of US$43,977 (J$2,066,920) or 43.95% of the total project cost to be solicited from other sources such as the Jamaica Agricultural Development Foundation (JADF), over the period of implementation of the project.

Total annual production by the proposed R2RW plant nursery is projected to rise from 295,651 units in year 1, to 323,983 units in year 2 and to 453,441 units in year10, where units include seedlings, suckers and mini-setts. Total Annual Income for proposed R2RW plant nursery is estimated at US$86,853 (J$4,082,109) in year 1, rising to US$95,060 (J$4,467,835) in year 2 and at US$133,498 (J$6,274,412) in year 10. Total Annual Expenditure for the project is estimated at US$91,730 (J$4,311,289) in year 1, rising to US$93,930 (J$4,414,732) in year 2 and US$118,576 (J$5,573,087) in year 10. Total annual expenditure including direct costs and overheads is estimated at 105.61% of total sales revenue in year 1, 98.81% in year 2 and 88.82% in year 10.

The Annual Net Income for the project is estimated at a deficit of -US$4,876 (-J$229,180) in year 1 of the project, moving to a positive net income of US$1,130 (J$53,103) in year 2 and to an estimated annual net income of US$14,922 (J$701,325) in year 10 of the project. The project is estimated to generate a cumulative positive net balance of US$99,314 (J$4,667,764) by the end of year 10.

The operating net cash flow is projected at US$4,028 (J$189,303) in year 1, moving to US$10,034 (J$471,586) in year 2, and an estimated annual net cash flow of US$23,826 (J$1,119,808) by year 10 of the project. The project is estimated to generate a cumulative cash balance of US$195,997 (J$9,211,869) by the end of year 10.

The Net Present Value (NPV) of the project over 10 years is estimated at US$2,974 (J$139,756) at a real discount rate of 12.00%, while the Internal Rate of Return (IRR) is estimated at 12.71%. The total Return on Assets (ROA) is projected at an annual average of 6.71% over years 1-10. The total Return on Investment (ROI) is projected at an annual average of 18.82% over years 1-10. The total Return on Sales is projected at an annual average of 8.15% over years 1-10. These ratios reflect the viable levels attained by the financial projections.

The project will be relatively sensitive to increases in its operating costs, with a 10% increase in total operating expenses producing a -93% decline in estimated net income in year 4, all other factors being constant. The project is even more sensitive to fluctuations in its projected income levels, with a 10% decline in estimated income producing a -103% decline in estimated net income in year 4.

Based on the Feasibility Study, the proposed R2RW plant nursery will generate adequate income to fund the operating costs of over the 10-year period covered by the study. However the projections are conservative and the proposed R2RW plant nursery will have to receive sustained marketing support to maintain targeted income levels.

1.0 INTRODUCTION AND BACKGROUND

1.1 Country Background - Jamaica

Jamaica is the third largest island in the Caribbean with a land area of 4,411 square miles, (11,425 sq. km.) and is located in a favourable central geographical position, approximately 500 miles (800 km) or 1½ hours flying time south of Miami. Jamaica has a population of 2.5 million people, of which 66% are under 29 years of age, and an estimated annual population growth rate of 1.1%.

The economy of Jamaica is based primarily on the mining and export of bauxite and alumina, a growing tourism sector, production of a range of domestic and export agricultural crops, a limited industrial base and relatively developed financial and commercial sectors. Continued attempts for economic reform by successive governments resulted in an economic expansion in the late 1980s, which was sustained during much of the decade of the 1990s until the contraction of the economy in recent years. The commitment to political democracy is paralleled by the island's respect for private property and the free market.

Jamaica also possesses the largest English-speaking workforce in the Caribbean Basin, estimated at some 1,150,000 persons in 1995. Jamaica is also well provided with the required infrastructure for economic growth including reliable electricity supply; abundant supply of potable water; an advanced telephone and international telecommunications system including direct dialing to most countries of the world; and one of the most extensive road networks of any developing country in the hemisphere. Jamaica has two (2) international airports, the Norman Manley International Airport in the capital city of Kingston and the Donald Sangster International Airport in Montego Bay. The island also has a total of four (4) international cruise ship ports.

Jamaica has seen some development in environmental conservation and sustainable development in recent years, including the role of the Natural Resource Conservation Authority (NRCA) as the main body responsible for environmental policy, planning and enforcement, and its proposed merger with other agencies including the Town Planning Agency to form the National Environment and Planning Agency (NEPA). The recent completion of the South Coast Sustainable Development Plan as well as the adoption of the Policy for Jamaica's System of Protected Areas are positive developments. These are complemented by the activities of a number of non-governmental organizations (NGOs) and umbrella organizations including the Environmental Foundation of Jamaica (EFJ), National Environmental Societies Trust (NEST), Caribbean Coastal Area Management Foundation (CCAM) and the Jamaica Conservation and Development Trust (JCDT). However, Jamaica's environment and natural resources are still threatened by unsustainable levels of deforestation in watershed areas and pollution, and increased work by public and private sector agencies and NGOs will be required in order to address these environmental issues adequately.

1.2 Project Background

The Ridge to Reef Watershed Project (R2RW) is a 5–6 year project funded and implemented by USAID and the Government of Jamaica (GOJ), with the overall objective of contributing to improved quality of key natural resources in areas of Jamaica that are both environmentally and economically significant. R2RW comprises three main components: (i) Assisting targeted organizations to identify and promote sustainable environmental management practices by resource users; (ii) Identifying and supporting solutions to improve the enforcement of targeted existing environmental regulations, primarily in the Great River and Rio Grande Watersheds; and (iii) Providing assistance to key organizations to support, coordinate, and expand watershed management efforts in Jamaica.

The Great River Watershed

The Great River traverses or forms the border between four parishes namely St Elizabeth, St James, Hanover and Westmoreland. The area designated as the Great River Watershed falls under the administrative jurisdictions of four parishes. A recent Rapid Assessment of the watershed indicates that farming activities have declined and once popular enterprises including beef cattle and banana are no longer as significant in the economy of the watershed. Beef cattle farming has declined due to a fall in demand for beef on the local market and the preference of hotels and high-end restaurants for Grade A imported beef. The decline of banana is caused by Black Sigatoka disease that destroys the leaves of banana and plantain plants. Due to low fruit and vegetable production the Great River Watershed is not exploiting to the fullest the market that the greater Montego Bay area offers. In addition forestry in the watershed is not as extensive as desired and consequently is not contributing to its full potential to the economy or the environment. However there have been some positive trends in citrus and coffee production.

R2RW Plant Nursery Project

In order to contribute to the environmental and economic objectives in the GRW, the R2RW project seeks to establish a plant nursery at Montpelier, St, James, with the aid of local partners and donors, to support development of crop and forestry enterprises that will contribute to improving the economic well being of the people, and stability of the environment of the GRW. R2RW wishes the plant nursery to be a sustainable contribution to the development of the watershed and to continue to function beyond the end of funding by USAID.

R2RW has undertaken the preparation of a Feasibility Study of the proposed R2RW plant nursery for the next ten (10) years, taking into account demand and financial analysis, stakeholder perspectives and ownership and management alternatives, in order to place its long-term operation on a sustainable basis.

2.0 LOCATION ANALYSIS

2.1 Project Area

2.2.1 Definition of Project Area

While the project area for the overall R2RW project is the GRW (see Figure 1), the project area for the R2RW plant nursery project is defined for the purposes of the feasibility study as the following four (4) parishes: St. James, Hanover, Westmoreland and St. Elizabeth (see Figure 2).

The specific benefits of the plant nursery to the overall R2RW project will accrue to farmers and other beneficiaries of farming income who produce or reside within the GRW. The four parishes also represent a marketing radius within which the plant nursery may be assumed to have a comparative advantage relative to plant nurseries located elsewhere in the island.

Within the overall project area, the more immediate radius of influence of the proposed R2RW plant nursery and the GRW area may be approximated by the following extension areas which either fall wholly or partly within the GRW or are immediately contiguous to its borders (see Figure 3):

Parish	GRW Area - Extension Areas	
St. James	Ext. Area 26	Latium
	Ext. Area 27	Maroon Town
	Ext. Area 28	Cambridge
	Ext. Area 29	Montego Bay
Hanover	Ext. Area 30	Miles Town
Westmoreland	Ext. Area 36	Bethel Town
St. Elizabeth	Ext. Area 38	New Market

2.2.2 Description of Project Area

The most direct benefits of the R2RW plant nursery project should devolve on the farming community within the Great River Watershed bounded by South-eastern Hanover, Northern Westmoreland and South-western St. James. However the availability of planting material will be an attraction to farmers much wider a field. Attention is therefore being paid to a possible demand area which would include not only Hanover, St. James and Westmoreland but also the leading agricultural parish of St. Elizabeth, all of which comprise the county of Cornwall.

This area has always been important in terms of agricultural production. In the past, traditional export crops notably sugar and bananas held sway. The contraction of the sugar industry has significantly reduced the importance of sugar cane growing in St. James and Hanover. However it remains dominant in Westmoreland with the largest sugar factory at Frome and important in St. Elizabeth where the Appleton factory is located. The decline of bananas was accelerated by the closure of Montego Bay as a banana port. Livestock remains an important component of agriculture in the area and benefited from the grassland improvement projects of the 1950s and 1960s.

The county of Cornwall achieved and retains a leading role in terms of domestic crop production with St. Elizabeth and Westmoreland and St. James ranking first, third and seventh respectively among the parishes. Over the years, domestic crop production was left to the small farmers, as attention and research were directed at the traditional export crops. These farmers were often left

to produce on small holdings on lands with severe agricultural limitations due to slopes and highly erodable soils. Under pressure for lands to cultivate, natural forests on slopes with thin soils overlaying limestone formations were cleared with predictable and disastrous results. Hence the need for extensive re-afforestation and soil conservation practices.

Hanover and St. James have a similar pattern of agricultural practices and production as a result of the similarity in topography, rainfall and history of land ownership. The terrain rises from a narrow coastal strip to altitudes of some 2,000 feet above sea level merging into a southern white limestone plateau and hills suitable only for natural forests related to the Cockpit Country. There is a very limited amount of Class 1 & 2 agricultural lands and the bulk of the agriculture practised is rainfall dependent. In St. James where sugar cane and bananas once occupied some 90 percent of the farms, there is now much greater emphasis on citrus and coffee production. Attention is now being given to orchards of avocado and mangoes as well as pineapples and solo papaya. There is mixed cultivation of ground provisions such as yams, cocoes, dasheen, sweet potatoes, plantains and fruit trees including breadfruit, soursop, otaheitie apples, ackees, etc. More recently a number of exotic vegetables are being grown to meet the needs of the tourist trade. The parish is currently producing between 4 &5 per cent of the domestic crops annually. Hanover ranks as one of the smallest parishes producing between 2 and 3 per cent of the island's domestic crops with a profile similar to that of St. James. Cocoa is a traditional crop in this parish and citrus cultivation has expanded. This parish has suffered extensively from soil erosion and a lot of work has been done to introduce soil conservation practices.

Westmoreland has a good deal of lands below a 5 degree slope but much of this has severe drainage limitations. As a result most of that portion which may be drained and made arable is either in pastures or sugarcane which is the most important cultivated crop. The parish ranks second in terms of livestock production. Despite this it ranks third in domestic crop production. It is no different to St. James, Hanover or Northern St. Elizabeth in terms of its domestic crop profile. The land being farmed by the small farmers is similar in topography and the problems experienced by them are the same. There is a difference however in Southern St. Elizabeth where one of the most productive areas remains under constant threat of drought from low rainfall (about 35 inches with a seasonal distribution) and a fairly porous soil. Farmers resort to heavy mulching and rudimentary drip irrigation to survive. Despite all this St. Elizabeth remains the top producer in domestic crops with a reputation for quality production. They produce a wide range of ground provisions, condiments and vegetables including exotics for the hotel and supermarket trade.

2.2 Project Site

2.2.1 Location

The proposed site for the R2RW plant nursery will be in Montpelier, St. James, directly adjacent to the former Cornwall Dairies site now owned by the Montpelier Citrus Company. The location of the project site is shown in Figure 4.

2.2.2 Characteristics

Size The total proposed site for the R2RW plant nursery is estimated at one (1) hectare (2.47 acres) as follows:

Area	Hectares	Acres
Shade House	0.10	0.25
Open Nursery Beds	0.71	1.75
Ancillary Space	0.19	0.47
Total	1.00	2.47

Shape	Assumed to be regular rectangular plot
Topography	Flat and gently sloping land

2.2.3 Services

Road Access	Good access by Montpelier main road or from Montpelier Citrus Company property.
Water	Water available from 3 inch pipe fed by spring at Blue Hole approximately 200 feet above the site.
Electricity	Available from power lines on Montpelier main road.

3.0 PROJECT DESCRIPTION

3.1 Proposed Development - Plant Nursery

The proposed R2RW plant nursery will include the following elements:

Element	Size	Specifications
Shade House	1,007 sq. m. (0.25 acre)	Sunstopper shade structure with 73% black polypropylene shade fabric
Screen House	201 sq. m. (2,160 sq. ft.)	Insect-proof mesh
Potting Shed	27 sq. m. (288 sq. ft.)	Wooden frame and concrete base
Store Room	13 sq. m. (144 sq. ft.)	Concrete block structure
Open Beds	0.71 hectares (1.75 acres)	Irrigated and covered with ground cover plastic
Irrigation System	0.81 hectares (2 acres)	Ground sprinklers – Open beds Elevated sprinklers – Shade house Misting Propagator – Screen house
Nursery Equipment	N/A	See Financial Table 1c
Perimeter Fencing	432 m. (1,419 ft.)	2 m. chain link with concrete base
Internal Roadway	61 m. (200 ft.)	Packed earth and marl

The screen house, potting shed and storeroom will be located on the 0.19-hectare (0.47 acre) area of the nursery which is planned for ancillary space (see Section 2.2.2 above).

3.2 Technical Aspects

3.2.1 Propagation

The screen house will be used to propagate seedlings in 72-cavity and 98-cavity seedling trays on raised 16'x4' wooden benches. Seedlings also will be grown in seedling bags in the shade covered area and the open nursery. In addition, preparation of mini-sett yams will be carried out on benches in the potting shed.

Planting material for vegetable crops will be obtained from local and foreign commercial suppliers of seeds. Plantain & banana suckers will be propagated from imported planting material and grown in seedling bags in the shade covered area. Whole yams will be purchased for the preparation of yam setts.

Propagation of fruit tree crops, hard woods and forestry species will involve field investigations to identify and select good sources of plant seeds for collection and propagation in seedling bags in the open nursery. Propagation of fruit tree crops and ornamentals also will involve grafting techniques to produce seedlings with desired qualities.

Planting media will include commercial potting mixes for vegetable seedlings and suckers.

3.2.2 Irrigation

The open nursery will be irrigated by a ground sprinkler system while the shade covered area will be irrigated by elevated sprinklers attached overhead to the shade structure. A misting propagator will be installed in the screen house. The irrigation system will be gravity-fed at a pressure of approximately 40 psi from a spring at 200 feet above the site.

3.2.3 Cultivation

The screen house will provide an environment which is free from insects and other vectors. Weed control in the shade house and open nursery will be effected by use of polypropylene ground cover plastic. Water-soluble fertilizer will be applied through the irrigation system and misting propagator according to the regimen for each crop. Insecticides such as Malathion and Diazinon and soil and systemic fungicides such as Redimil and Basudin will be applied according to manufacturers' specifications and the growing conditions.

Plants typically will be ready for sale at the appropriate age and height for transplanting depending on the specific crop, and will be sold either as rooted plugs or in seedling bags.

Yam mini-setts will be prepared in setts from purchased whole yams and dipped in fungicide. Yam mini-setts will be planted in the field and grown out under contract by selected farmers in the GRW, to provide seed yams as planting material to be sold to yam farmers in the project area.

3.3 Environmental Aspects

The environmental aspects of the proposed R2RW plant nursery will be of priority importance in the development of the project. All steps will be taken to ensure that the land clearing and construction work takes place in accordance with recommended measures for environmental conservation. Environmental risk mitigation measures including minimizing dust and noise pollution during the construction and operating stages and proper procedures for waste water and solid waste disposal will be employed.

While it would be desirable for the proposed nursery to practice organic farming, the nursery will be located in close proximity to farming using chemicals, including the adjacent Montpelier Citrus Company nursery. In addition, as organic farming is not widespread in the project area, the benefits of providing organically grown seedlings would not be realized by farmers. Consequently, the proposed nursery will employ chemical fertilizers and pesticides, until the farming conditions in the project area are conducive to the introduction of organic farming.

3.4 Project Benefits

The benefits of the proposed R2RW plant nursery in the GRW and the four western parishes will include the following:

- Introduction of improved varieties of selected crops with higher yield, resistance to disease and lower mortality rates
- Reduced time and resources spent by farmers in self-propagation of planting material
- Establishment of efficient and modern plant propagation centre in the GRW
- Availability of high-quality planting material on consistent and predictable basis allowing farmers to plan production

- Demonstration of benefits of efficient plant propagation methods
- Increased yield and income to farmers in the GRW

4.0 CROP PRODUCTION ANALYSIS

4.1 Land Capability - Project Area

The crop production analysis begins with an analysis of the land capability of the project area. The following Table 1 sets out the land capability of the four parishes in the project area by land class. As the table shows, the four parishes have a total area of approximately 283,945 hectares, of which 55,957 hectares or 19.7% of the total area is represented by land in Class I and II, most suitable for cultivation. 49,945 hectares or 17.6% is suitable for cultivation with major limitations, while the remainder is marginal or not suitable for cultivation. St. Elizabeth is the parish with the highest absolute and relative areas of land suitable for agriculture in the project area.

4.2 Existing Production - Project Area

As a background to the analysis of existing production in the project area, Tables 2 and 3 below present an overview of agricultural production in the island. As shown in Table 2a, total crop area reaped in Jamaica has declined by 23% over the ten (10) years from 1991-2000, with the greatest fall in legumes and cereals. However crop production in tonnes has actually increased by 8.5% over the same period (see Table 2b). This results from an 11.9% increase in average productivity per hectare over the period (see Table 2c).

As shown in Table 3, St. Elizabeth is the largest agricultural parish in the island, both in crop production and area reaped, while Westmoreland is the third largest. The proposed R2Rw plant nursery therefore will be located within the largest agricultural region in the island, despite the fact that St. James and Hanover are relatively small agricultural parishes.

Table 4 shows the breakdown of area reaped by crop in the four parishes in the year 2000. The table indicates that vegetables, yams and other tubers are the most important short-term crops in each of the parishes in the project area, with the exception of St. Elizabeth where legumes represent the largest area reaped.

Table 5 presents a summary of the number and size of agricultural holdings in the four (4) parishes of the project area, while Table 6 shows the farm holdings by land use, based on the Census of Agriculture in 1996. Table 5 confirms the importance of the project area as an agricultural region, as the four parishes account for over a third of the total number of farm holdings representing over a quarter of the total area of holdings in the island. As indicated in Table 6, crop cultivation in pure and mixed stands represent the dominant productive use of farm land throughout the four parishes of the project area.

Tables 7a-7d contain a more detailed breakdown of the area of holdings under crop cultivation in the four (4) parishes of the project area, including total hectares in permanent crops, legumes, vegetables and condiments fruits, cereals and tubers, based on the Census of Agriculture in 1996. As shown in Table 7a, the traditional permanent crops – sugar cane, bananas, coconut and citrus – continue to dominate farm holdings in the project area, with yams and other tubers, legumes and vegetables as the next most important crops. Table 7b indicates that the other important permanent crops include significant holdings in mango, pimento and plantain, while Table 7c shows pumpkin and tomato as the most widely grown vegetables, with significant areas of carrot, sweet pepper, cabbage, hot pepper and other condiments. As Table 7d indicates, the project area also contains significant holdings in watermelon and pineapple.

Table 8 presents estimates of the area reaped by parish and crop detail in the project area in the year 2000 for relevant crops. Table 9 presents estimates of the area reaped for the same crops in the extension areas which correspond most closely to the boundaries of the GRW (see Section 2.1 above).

As Table 8 shows, yams, tomatoes and cabbage are the most important of the selected crops within the project area, in terms of both area reaped and crop production. Plantain and sweet pepper are the next most important based on the figures for 2000.

When the focus is narrowed to the extension areas which are within or contiguous with the GRW, the pattern of production of the selected crops is somewhat different – while yams still represent the largest area reaped, plantains become the next largest crop, while the area reaped in tomato is only slightly larger than the area reaped in cabbage or in hot and sweet pepper combined. Noticeable also is the relatively large area of pak choi cultivation in the Cambridge and Maroon Town extension areas of St. James. It is also important to note that despite the existence of the Sandals/RADA/Mafoota vegetable farming group within the GRW, almost all of the exotic crops including cauliflower, zucchini and broccoli, are mainly grown in St. Elizabeth.

4.3 Planned Production - Project Area

Table 10 below presents a summary of planned expansion of agricultural production in the project area based on a number of specific projects.

4.3.1 Domestic Food Crop Production & Marketing Project

The Domestic Food Crop Production & Marketing Project implemented by MINAG involves the provision of planting material and other support to farmers in eleven (11) parishes including St. James, Westmoreland and St. Elizabeth, to establish targeted hectares of selected domestic food crops, including vegetables, condiments, plantains and tubers. Table 10 shows the targeted levels of hectares for relevant crops which the Domestic Food Crop Project plans to have established in St. James, Westmoreland and St. Elizabeth in the year 2001/2002. While it is planned to establish 33 hectares of plantain, the suckers will be obtained primarily from the 12 hectare (30 acre) plantain nursery operated by MINAG at the Orange River Research Station in St. Mary. However, some possibility may exist for the proposed R2RW plant nursery to provide plantain suckers to the Domestic Food Crop Project should the production of plantain suckers from Orange River be inadequate to meet the requirements to establish the targeted hectares. A purchase price of J$8-10 per sucker was quoted by the project. Similarly the opportunity may exist for the proposed R2RW plant nursery to provide seedlings for some of the targeted hectares of tomato, sweet pepper and scotch bonnet pepper. No hectares of exotic vegetables are targeted for the western parishes. However, the implementation of the Domestic Food Crop Project depends on the annual budget provided by MINAG, and no firm targets for planting areas by crop have been set for the years after 2001/2002.

4.3.2 Fruit Tree Crop Project

The objectives of the Fruit Tree Crop Project implemented by MINAG include the establishment of 1,700 hectares of 13 designated fruit tree crops islandwide over the three years from 2000-2002, and establishment of a new seedling nursery at Bodles Agricultural Research Station and upgrading of the nursery at Orange River Agricultural Research Station to provide a combined production capacity of 450,000-660,000 seedlings per annum.

The total targeted area by fruit tree crop over the 3-year project period is shown in Table 10. However the location by parish is not included and will depend on the geographic distribution of participating farmers. The most important crop targeted is ackee, accounting for over 50% of the total targeted area to be established under the Fruit Tree Crop Project. The other main crops include mango, breadfruit, guava, soursop and avocado. The Fruit Tree Crop Project did purchase up to 50,000 seedlings from private nurseries in the first year of the project, primarily ackee seedlings, at prices ranging from J$30-80 per seedling. However, with the coming on-stream of the nursery production at Bodles and Orange River, the project will be able to meet its requirements for planting material from its own nurseries. The seedlings will be provided free to

farmers during the duration of the project, and it is projected that seedlings will be sold at commercial rates thereafter.

4.3.3 Forestry Department

Table 10a shows a summary of the requests for timber and forestry seedlings received by the Forestry Department from farmers and land holders in the western parishes since 1997. The species requested include cedar, mahoe, mahogany, Spanish elm, teak, broadleaf, pine, Santa Maria, bitterwood, neem, lignum vitae, willow and cupressus, as well as fuel wood, fruit trees and ornamental species. As the table shows, farmers in the four parishes with total farm holdings of 5,554 hectares are presently seeking to establish some 840 hectares in timber and forestry, with the greatest interest from farmers in Hanover and St. James. At an average of 1,000 seedlings per hectare, this would indicate a current demand of 840,000 seedlings from the western parishes alone.

The Forestry Department currently operates four (4) seedling nurseries located at Moneague, Williamsfield, Mount Airy and Clydesdale. The 2001/2 production target for the nursery at Williamsfield which is closest to the western parishes is 100,000 seedlings per annum, while the total production target of all 4 nurseries for 2001/2 is some 315,000 seedlings per annum. It is planned that total nursery production capacity of the Forestry Department will reach some 1.48 million seedlings per annum by the year 2005.

While the Forestry Department plans to expand its nursery capacity over the medium term, its present production is insufficient to meet the current demand for seedlings by farmers, with its total annual island-wide production target for 2001/2 representing only 38% of the demand from the western parishes alone. Indeed a backlog in requests has developed, and the unsatisfied demand may offer an opportunity for the R2RW plant nursery project to supply timber and forestry seedlings to farmers and land holders who are willing to pay for seedlings rather than wait for an uncertain length of time to receive seedlings from the Forestry Department. The Forestry Department itself has purchased seedlings from private nurseries in the past to meet its requirements, and plans to privatize seedling production over the long term. The Trees for Tomorrow project currently being implemented by the Forestry Department with funding from CIDA has a budget for contracting up to 50,000 seedlings from the private sector based on competitive tender.

Another forestry project which may involve the western parishes is the proposed Spinal Forest Project which will aim to restore forest cover to the entire central spine of the island. This long-term reforestation project will commence in 2002 with the establishment of a 250 hectare demonstration plot in central Jamaica to be funded by the Environmental Foundation of Jamaica (EFJ). While this project may generate long-term demand for timber and forestry seedlings, the project is still in the preliminary stages of formulation and no precise projections are presently available.

5.0 MARKET ANALYSIS

5.1 Target Market Segments - By Crop

The market analysis commences with the selection of the crops which the project will target for production of planting material. Table 11 presents a summary of the process by which the major categories of crops to be targeted for the proposed R2RW plant nursery were selected.

5.1.1 Elimination of Unsuitable Crops

Starting from the full range of crops being grown in the project area (see Section 4.2 above), a number of crops can be eliminated based on a range of criteria.

In the first place, several major crops can be eliminated as their typical methods of cultivation are not suitable for the use of planting material supplied by a commercial nursery (see also Table 11a). The crops eliminated on this basis include sugar cane which is propagated in the field by regeneration of ratoons; legumes, cereals, pumpkin, melons, squashes and zucchini (propagated by direct planting of robust seeds into the field); and pineapple (vegetative propagation). Other crops such as carrots, onions, escallion, turnip, celery, and beetroot are grown at such high planting densities that the cost of seedlings would be prohibitive, and these crops are grown from seeds.

It should be noted that while typical methods of cultivation of yams and other tubers do not use commercial planting materials, yams have been included based on the proposed introduction of the mini-sett technology of propagation. Also plantains & bananas have been included based on the proposal to propagate suckers from superior imported genetic stock.

Secondly, a number of crops may be eliminated because there are existing sources of seedlings and planting materials which are adequate to meet their requirements (see also Section 5.4 and Table 15 below). The main crop to be eliminated on this basis is citrus, including oranges, grapefruit, ortaniques, tangerines, ugli and limes. While citrus is a major crop in the project area which was initially seen as a potential target market for the R2RW plant nursery, the Montpelier Citrus Company (MCC) already operates a citrus nursery at Montpelier, St. James, which will have the capacity to produce citrus seedlings to meet the needs of their own farm and to supply planting materials for over 1,060 hectares (2,600 acres) of existing and planned citrus holdings by farmers in the project area. As the MCC nursery is certified by the Jamaica Citrus Protection Agency as a supplier of citrus seedlings which are free from and resistant to the Citrus Tristeza Virus, it is not considered that the R2RW plant nursery can or should attempt to compete with the MCC nursery in the production of citrus seedlings.

Other crops which may be eliminated on the same basis include cocoa and coconuts, where the Cocoa Industry Board and the Coconut Industry Board provide seedlings to farmers, either at subsidized rates or on other favourable terms. In addition coffee is eliminated on the same basis, as the Coffee Industry Board operates a seedling nursery at its farm at Seven Rivers within the GRW, which has significant excess capacity. Grafted pimento seedlings are also available from MINAG.

Finally, other crops such as mustard and eggplant are eliminated on the basis that the market for the final crops and the crop areas reaped are too limited to be targeted by the proposed plant nursery.

5.1.2 Selection of Targeted Crops

The crops which remain after this process of elimination represent the target market segments for the proposed R2RW plant nursery. The crops targeted for the plant nursery include the following (see Table 11):

Targeted Crops

Vegetables & Condiments

Cabbage
Cauliflower
Lettuce
Pak Choi
Tomato
Broccoli
Hot Pepper
Sweet Pepper

Other Crops

Plantains & Bananas
Yams
Fruit Tree Crops
Ornamentals
Timber & Non-Timber Forest Species

In the following section the market situation for each of the selected crops is analysed.

5.2 Market Analysis - Overview

The analysis of the market for agricultural crops in Jamaica is conditioned by the range and content of the available sources of relevant data. There are several recent studies carried out by the Ministry of Agriculture on usage of various crops in a number of sectors and industries including hotels, agro-processors and fast food restaurants, as well as annual data on crop production, areas reaped and average farmgate and retail prices. In addition, data on the import and export of agricultural items are contained in the statistics on external trade, and additional data on the export of non-traditional fresh produce is available from the JEA.

However, there are very few market studies of particular crops or crop groups which are comprehensive enough to provide an accurate estimate of the demand from all segments of the market. Typically the studies on consumption in various sectors only capture a fraction of the total production of the relevant crops as recorded in the annual crop production data. The main component of aggregate demand which is not captured by the market studies is domestic household consumption where, unlike exports, distribution is carried out by a wide number of intermediaries, many operating in the informal sector of the economy, and through local markets where data collection mechanisms are absent. For example, the Charles Gordon Market in Montego Bay reports average sales of food crops valuing approximately J$16 million (US$0.35 million) per month passing through the market, but is unable to provide any details by crop or volume.

Consequently the approach to the market analysis has been as follows:

i. A wide number of data sources have been researched, and data from these sources on market segments and crops has been attached as appendices. These data sources also are referred to as relevant in the market analysis of individual crops in Section 5.3 below.

ii. The total aggregate demand for relevant crops has been approximated by the sum of total annual domestic production (including production for export) and total annual imports for each crop, where imports would represent the portion of total demand not satisfied by domestic production. The estimates of total aggregate demand for the relevant crops as approximated on this basis are presented in Table 12.

iii. The estimates of total aggregate demand for the relevant crops are converted to hectares of production based on the average yield per hectare for each crop as derived from the all-island production and crop area reaped. The results as presented in Table 12a represent the total potential hectares of each crop required to meet the total estimated demand.

5.3 Market Analysis - By Crop

Table 13 presents the all-island crop production and area reaped for selected crops for the years 1991, 1999 and 2000. As a general note to Table 13, the consistent decline in production in the year 2000 as compared to 1999 for all crops is due to the drought which affected many parts of the island in 2000. Permanent crops including fruit trees and timber, and non-food crops such as ornamentals are not included.

5.3.1 Vegetables

As shown in Table 13, local production of the selected vegetables increased by 84.8% from 32,368 tonnes in 1991 to 59,816 tonnes in 1999, before falling to 50,062 tonnes in 2000. The most significant vegetables among the selected crops in terms of production are tomato, cabbage, pak choi and iceberg lettuce respectively.

The main markets for the selected vegetables include food processors, the hotel and restaurant sectors, and local households. None of the vegetable crops targeted for seedling production by the proposed R2RW plant nursery – cabbage, cauliflower, iceberg lettuce, pak choi, tomato, broccoli - are exported from Jamaica to any significant extent.

A market study carried out in 1999 by MINAG for the Domestic Food Crop Production & Marketing Project sought to measure total consumption of a number of fresh produce crops by a range of market segments including agro-processors, exporters, hotels, importers/distributors, restaurants and supermarkets, and including both domestic and imported produce. The total consumption in lb. per month and tonnes per year for the crops selected for the proposed R2RW plant nursery based on this study are presented below (see also Appendix No. 6). In addition another study was carried out in 1997 by MINAG to measure amounts of fresh produce purchased by hotels, and the estimated hotel consumption of the crops selected for the proposed R2RW plant nursery based on this study also are presented below (see also Appendix No. 7).

Comparison of Consumption Estimates in 1999 Study & 1997 Study				
Crop Detail	**1999 Study**		**1997 Study**	
	Lb per Month	**Tonnes per Year**	**Kg per Month**	**Tonnes per Year**
Cabbage	79,918	435	33,156	398
Cauliflower	21,146	115	N/A	N/A

Comparison of Consumption Estimates in 1999 Study & 1997 Study				
Crop Detail	1999 Study		1997 Study	
	Lb per Month	Tonnes per Year	Kg per Month	Tonnes per Year
Iceberg Lettuce	54,990	299	N/A	N/A
Pak Choi	1,808	10	10,148	122
Tomato	315,315	1,716	81,437	977
Sweet Pepper	43,303	236	20,981	252
Broccoli	5,102	28	N/A	N/A

As may be seen above, the two studies have produced differing results, with the 1997 study showing levels of consumption in hotels alone that are close to or higher than the combined consumption from hotels, agro-processors and other market segments in the 1999 study. It should further be noted that these market estimates fall significantly short of the documented actual production levels of the same crops as recorded by the annual RADA statistics, where for example the annual production of tomato in 1999 was some 21,562 tonnes (see Table 13), compared to an annual market estimate of only 1,716 tonnes in the 1999 study. Similarly the market estimate for sweet pepper of 236 tonnes in the 1999 study represents only 3% of the actual production of 8,546 tonnes in the same year.

The importance of the hotel sector as a market for vegetables is enhanced by the existence of the RADA/Mafoota Farmers Group located within the GRW, the Mafoota community being approximately 20 kilometers from Montego Bay. Farmers in this community with the assistance of RADA have entered into marketing arrangements to supply the Sandals hotels in Montego Bay with a range of exotic and local vegetables, including sweet pepper, cabbage, zucchini, cantalopes, yellow squash, lettuce, pak choi, cucumbers, tomatoes, broccoli and cauliflower. Presently in the Mafoota area there are approximately 28 hectares under cultivation including some 18 hectares of exotic vegetables. Interviews with hotels in Montego Bay revealed significant levels of purchases of vegetables with the Sandals Montego Bay alone purchasing on an annual basis an average of 14 tonnes of lettuce, 17 tonnes of tomato, 4 tonnes of sweet pepper, 6 tonnes of cabbage, 2 tonnes of pak choi and over 1 tonne of broccoli. In addition the 1997 study on hotel consumption indicated significant levels of unfulfilled demand for local fresh produce in the hotel sector, ranging from 38 tonnes per annum for broccoli to 9 tonnes per annum for cauliflower and 59 tonnes per annum for lettuce. The RADA/Mafoota Farmers Group will be an important potential target market for the purchase of seedlings produced by the proposed R2RW plant nursery, based on their marketing links with the hotel sector in Montego Bay and their proximity to the nursery.

Based on the fresh produce export statistics of the JEA, exports of vegetables in 2000 totaled 2,219 tonnes valued at US$2,324,734 (see Appendix 3). However the detailed breakdown of these figures do not show any evidence of exports of the vegetable crops targeted for seedling production by the proposed R2RW plant nursery.

5.3.2 Condiments

As shown in Table 13, local production of condiments increased by 189.7% from 5,146 tonnes in 1991 to 14,909 tonnes in 1999, before falling to 12,315 tonnes in 2000.

Based on the fresh produce export statistics of the JEA, exports of herbs & condiments in 2000 totaled 308 tonnes valued at US$1.681 million (see Appendix 3). The external trade statistics indicate that exports of hot pepper in 2000 totaled 260 tonnes valued at US$0.58 million (see

Appendix 8). The overseas market for hot pepper is mainly based on demand from ethnic communities in the United States, Canada and Europe, where Jamaican peppers command a premium price including scotch bonnet which is recognised for its distinctive flavour. Improved strains of scotch bonnet pepper for export are being developed at the Montpelier Research Station under a project funded by the Food and Agriculture Organization (FAO).

The local agro-processing industry is an important market for hot pepper in Jamaica, with some seven (7) main processors using varieties of capsicum including Habanero, West Indies Red and Scotch Bonnet to produce hot pepper sauces, jerk sauces, pickles and other products. Based on a survey carried out by MINAG in 1999, the volume of hot pepper used by local agro-processors increased from 323 tonnes in 1995 to 643 tonnes in 1998 (see Appendix 4). An estimated 42.8 hectares of crop production would be required to meet the annual demand for hot pepper by agro-processors in 1998.

The market study carried out in 1999 for the Domestic Food Crop Production & Marketing Project estimated the total consumption of hot pepper by agro-processors, exporters, hotels, importers/distributors, restaurants and supermarkets at 66,595 lb. per month or 362 tonnes per year (see also Appendix No. 6), while the 1997 study estimated the hotel consumption of hot pepper at 1,971 kg. per month or 24 tonnes per year (see also Appendix No. 7).

The production and sale of scotch bonnet pepper seedlings will be an important component of the proposed R2RW plant nursery, based on the increasing local and export market for scotch bonnet pepper, and based on the linkage with the Montpelier Research Station to obtain improved strains of scotch bonnet pepper seeds. Farmers in suitable areas in and adjacent to the GRW including Mafoota, Garland and New Market will be targeted as potential purchasers of scotch bonnet pepper seedlings.

5.3.3 Plantains

As shown in Table 13, local production of plantains increased by 3.1% from 26,692 tonnes in 1991 to 27,524 tonnes in 1999, before falling to 22,332 tonnes in 2000.

The main markets for plantain include food processors who purchase up to 225 tonnes per annum for the manufacturing of chips, and local households for domestic consumption. Exports of plantain have declined rapidly over the past decade to negligible levels, due to competition from other countries including Colombia, Ecuador and Venezuela. Plantain also finds only limited use in the local hotel sector.

The market study carried out in 1999 for the Domestic Food Crop Production & Marketing Project estimated the total consumption of plantain by agro-processors, exporters, hotels, importers/distributors, restaurants and supermarkets at 37,318 lb. per month or 203 tonnes per year (see also Appendix No. 6). Again this only represents a small fraction of annual production of plantain, with the largest volumes of sales passing unrecorded through the town markets and other informal distribution channels.

The proposed R2RW plant nursery will develop a market for plantain and banana suckers based on the introduction of superior varieties which are higher-yielding and more resistant to disease including varieties resistant to the Black Sigatoka disease. The primary market will be existing farmers with areas in banana and plantain cultivation within or in proximity to the GRW.

5.3.4 Yams

As shown in Table 13, local production of yams increased by 5.1% from 186,104 tonnes in 1991 to 195,688 tonnes in 1999, before falling to 147,709 tonnes in 2000.

Yams are one of the most important export crops for Jamaica, principally to ethnic communities in the United States, Canada and Europe. Based on the fresh produce export statistics of the JEA, exports of root crops in 2000 totaled 9,924 tonnes valued at US$14,504,944 (see Appendix 3). The external trade statistics indicate that exports of yams in 2000 totaled 8,182 tonnes valued at US$10.95 million (see Appendix 8).

The market study carried out in 1999 for the Domestic Food Crop Production & Marketing Project estimated the total consumption of yams by agro-processors, exporters, hotels, importers/distributors, restaurants and supermarkets at 1,583,089 lb. per month or 8,617 tonnes per year (see also Appendix No. 6), while the 1997 study estimated the hotel consumption of yams at 27,492 kg. per month or 330 tonnes per year (see also Appendix No. 7).

The proposed R2RW plant nursery will develop a market for mini-setts and seed yams to permit yam farmers to grow smaller yams which are more suited to the export market. The impetus for introduction of the mini-setts and seed yams will be driven by the new imperatives of the export market, where the U.S. market will be restricting entry of yams which are cut and treated with fungicides. The plant nursery will target farmers in the yam-producing areas of the GRW including Cambridge and Great River, and in Hanover which is one of the largest yam-producing parishes in the island.

5.3.5 Fruit Tree Crops

Tree crops grown in Jamaica fall into two (2) categories:

i. Traditional orchard crops – citrus, coffee, cocoa and coconut

ii. Non-traditional orchard crops – ackee, breadfruit, nutmeg, mango, soursop, guava, june plum, cashew, avocado, naseberry, tamarind, otaheite apple, guinep, paw paw, pimento, rose apple, star apple

The traditional orchard crops have been eliminated from the market for the R2RW plant nursery project based on the fact that there are adequate existing suppliers of seedlings for these crops (see Section 5.1 above). Consequently the market analysis will focus on the non-traditional orchard crops.

There is an increasing demand for non-traditional orchard fruits. The international market is growing based on the trends toward health foods and demand for tropical and off-season fresh fruits in metropolitan markets. In particular the recent decision by the U.S. Food and Drug Administration to open the United States market to imports of ackee has provided a new impetus to the fruit tree crop sub-sector, with the demand for ackee projected to increase by 500% to satisfy the ethnic market in the U.S. Local markets for non-traditional fruit tree crops include food processors and the tourist sector, as well as domestic household consumption.

Based on the fresh produce export statistics of the JEA, exports of fruits in 2000 totaled 11,762 tonnes valued at US$9,218,230 (see Appendix 3). The external trade statistics provide further evidence of the importance of the export market for fruit tree crops with exports of mangoes in 2000 totalling 434 tonnes valued at US$0.74 million, soursop totalling 19 tonnes valued at US$0.03 million, avocado totalling 151 tonnes valued at US$0.24 million, and breadfruit totalling 640 tonnes valued at US$0.62 million (see Appendix 8). The tremendous potential of ackee is underscored by the levels of exports of processed (canned) ackee which totalled 1,075 tonnes valued at US$4.80 million in the year 2000.

The market study carried out in 1999 for the Domestic Food Crop Production & Marketing Project estimated the total consumption of guava by agro-processors, exporters, hotels, importers/distributors, restaurants and supermarkets at 20,833 lb. per month or 113 tonnes per

year, with the consumption of mango estimated at 197,081 lb. per month or 1,073 tonnes per year and soursop at 53,583 lb. per month or 292 tonnes per year (see also Appendix No. 6). A single hotel in Montego Bay reports its average consumption of mango at over 7 tonnes per annum.

The proposed R2RW plant nursery will produce fruit tree crop seedlings for farmers within or in proximity to the GRW who are seeking to establish orchards as well as some limited sales to householders seeking individual plants. Ackee will be the primary fruit tree crop to be targeted by the project, based on the emerging export market and the existence of a major certified ackee processing plant, West Best Foods Limited, in Darliston, Westmoreland, which estimates its potential annual demand for ackees at approximately 3,000 tonnes.

The market for fruit tree crop seedlings will be limited by a number of factors, including the relatively low planting density of fruit tree orchards compared to other crops such as vegetables, the fact that as permanent crops seedlings for fruit trees are only required for one-time establishment of hectares, and by the existing Fruit Tree Crop Project (see Section 4.3.2 above) which will provide free seedlings to farmers during the remaining 2 year duration of the project. Howe`ver the market for fruit tree crop seedlings should strengthen after the next two years based on the demand stimulated by the opening of the U.S. market for ackees and the demand stimulated by the Fruit Tree Crop Project which by then will no longer be distributing free seedlings.

5.3.6 Ornamentals

The markets for ornamental foliage and flowers produced by the local horticulture and floriculture industry include hotels, the local landscaping industry, households, and the export market. Based on the fresh produce export statistics of the JEA, exports of flowers & foliage in 2000 totaled 1,612 tonnes valued at US$1,553,624 (see Appendix 3). The local hotel industry spends up to US$20,000 per hotel on annual landscaping maintenance and up to US$500,000 on landscaping for construction of new projects. However no current data is available on the levels of total production and sales of ornamentals.

The market for ornamental seedlings is limited by a number of factors. Firstly, the hotels which are among the largest single purchasers of ornamentals, prefer to purchase finished plants to achieve immediate landscaping effects. In addition, many hotels operate their own plant propagation nurseries to obtain planting material from the stock of ornamentals on their own properties. Although hotels and horticulture producers purchase seedlings in trays to meet requirements which they cannot produce themselves, they prefer to import tissue-cultured seedlings from Miami to obtain the benefits of uniformity of genetic stock and quality. The external trade statistics indicate that Jamaica imported over US$250,000 of live plants with roots, including cuttings, slips and seedlings in 2000. Consequently the proposed R2RW plant nursery will only produce limited quantities of ornamental seedlings, primarily for sales to hotels in the Montego Bay area and to householders seeking individual plants.

5.3.7 Timber and Forest

The market for timber and forest seedlings is driven by the desire of private land holders to invest in long-term income-generating timber projects, particularly on lands which are unsuitable for more intensive cultivation, and by conservation programmes initiated by a number of public sector agencies and environmental NGOs.

The total annual demand for lumber in Jamaica is estimated at 200,769 cubic metres, including hardwood and softwood. When the demand for fuelwood, charcoal and yam sticks is included, the Forestry Department estimates the total area of plantation needed to sustain the annual demand for wood in Jamaica as 94,540 hectares. As the total area now in forest plantations in

Jamaica is only 8,187 hectares there is significant potential for the expansion of forest plantations, with a resulting demand for seedlings.

In addition the targets for government and private reforestation call for a total of 4,750 hectares to be planted island-wide over the five (5) year period 2001-2005, implying a requirement for approximately 4.75 million seedlings.

The GIS Data Base of the Forestry Department in March 2000 identified a total of 3,773 hectares of land in the Great River Watershed with the potential for reforestation. In addition, as described in Section 4.3.3 above, the Forestry Department has received requests for timber and forestry seedlings from farmers and land holders in the western parishes seeking to establish some 840 hectares in timber and forestry. For the purposes of the Feasibility Study, the potential market for the R2RW plant nursery has conservatively been limited to the pool of actual requests for seedlings from the western parishes, based on the percentage of farmers and land holders who are willing to pay for seedlings rather than wait for seedlings from the Forestry Department.

It may be noted that the conservation programme of the R2RW project itself may generate requirements for planting material in the GRW including up to 50 hectares of contour barriers with species such as flemingia. However as the budget for these requirements has not been finalized they have not been included in the market projections for the plant nursery.

5.4 Competitive Analysis

A Rapid Rural Appraisal of the GRW carried out in March 2001 identified that there are three (3) plant nurseries in the vicinity of the GRW. The market investigations carried out under the Feasibility Study confirmed these findings and provided more detailed information on the 3 existing plant nurseries as follows:

Location	Principal	Facilities	Crops	Sales
Irwin & Reading	Mr. Paul Hastings	Nursery & Retail Shop	Ornamentals, fruit tree crops	Plant sales to hotels, landscapers, households
Lethe	Mr. Bobby Miller	Nursery	Ornamentals, fruit tree crops	Plant sales to hotels, landscapers, households
Montego Bay	Mr. Allen	Nursery & Retail Shop	Ornamentals, fruit tree crops	Plant sales to hotels, landscapers, households

None of these nurseries sell seedlings, nor do they sell to farmers for agricultural production. As a consequence, the competitive analysis confirms that there are no commercial plant nurseries in western Jamaica within the project area which produce seedlings or which will offer significant competition to the proposed R2RW plant nursery.

However, as mentioned above, there are a number of public sector agencies and industry boards which are suppliers of seedlings and planting materials to farmers in several crops which would offer competition to the proposed nursery. As shown in Table 15 below, the proposed R2RW plant nursery will face competition from these sources. The competition from the suppliers of seedlings of citrus, coffee, coconut and cocoa is sufficient to eliminate these crops from the projections for the R2RW plant nursery (see Section 5.1 above). The competition from the suppliers of seedlings and planting materials of domestic food crops including vegetables,

condiments and tubers is only moderate within the four western parishes, and will not seriously affect the projections for the R2RW plant nursery (see Section 5.5 below). The level of competition from the suppliers of seedlings and planting materials of fruit tree crops, timber & forestry will be significantly high for as long as the free distribution of seedlings to farmers continues, and will seriously limit the projections for the R2RW plant nursery for these crops (see Section 5.5 below).

5.5 Seedling Market Projections - Proposed R2RW Plant Nursery

The seedling market projections for the proposed R2RW plant nursery are developed on the basis of the estimates of the area reaped by parish & crop detail in the year 2000 for selected crops in the project area and in the GRW as presented in Tables 8 and 9 above. It is projected that the sale of seedlings to farmers will increase gradually over time, with a percentage of the areas reaped converting to production by seedlings as farmers accept the change in propagation of planting material from self-propagation to purchase of commercially produced seedlings.

5.5.1 Market Acceptance Rates

The market acceptance rates represent the percentage of the annual crop areas reaped which purchase seedlings and planting material from the proposed R2RW plant nursery. Table 16 shows the targeted rates of acceptance by crop within the GRW and the four western parishes over the first 10 years of the nursery project. The acceptance rates among farmers in the extension areas within or bordering the GRW are targeted to be ten times as high as the acceptance rate in the more remote extension areas in the western parishes, as these farmers will be more accessible to the marketing efforts of the plant nursery and the overall R2RW project.

As shown in Tables 16a and 16 b, the targeted market acceptance rates are highest for hot pepper, where seedlings grown from improved scotch bonnet seeds obtained from the Montpelier Agricultural Research Station should prove particularly attractive to farmers, and for broccoli as an exotic crop with high returns to farmers based on the lucrative hotel market. Cauliflower and iceberg lettuce also have relatively high acceptance rates for similar reasons as broccoli. The lowest rates are projected for crops such as cabbage and tomato which are widely grown primarily for local markets. Nevertheless, even for hot pepper it is only projected that 5.00% of farmers in the GRW will purchase seedlings from the R2RW plant nursery in year 1, rising to only 7.75% by the end of year 10. By comparison the projections for cauliflower and iceberg lettuce are for 1.00% of farmers in the GRW to purchase seedlings in year 1, rising to 1.55% by the end of year 10. The projections for cabbage and tomato are for 0.20% of farmers to purchase seedlings in year 1, rising to 0.31% by the end of year 10.

For plantain and bananas the market acceptance rates would include farmers establishing new crop areas as well farmers replanting existing areas with suckers of superior varieties from the nursery.

5.5.2 Market by Crop Areas Reaped

Based on the estimated total crop areas reaped annually in the GRW and the four western parishes and the projected rates of acceptance of commercially produced seedlings, Table 17 presents the projected areas reaped annually by crop which will be grown from seedlings sold by the proposed R2RW plant nursery over the first ten (10) years of the project.

As Table 17c shows, the project will depend on relatively small areas of crop areas to purchase seedlings from the nursery each year. For hot pepper the crop area to be planted with seedlings from the nursery is projected at 4.14 hectares in year 1 rising to 6.42 hectares in year 10, while

the crop areas for broccoli and cauliflower are projected at 0.08 hectares and 0.09 hectares respectively in year 1, rising to 0.13 hectares and 0.14 hectares respectively in year 10.

For plantain and bananas the crop areas would imply crop areas which are progressively planted with suckers from the nursery each year as, unlike vegetables and condiments, the same areas typically would not require fresh suckers in subsequent years once they have been planted out. Based on Table 17c the cumulative crop area to be planted out with suckers from the nursery after 10 years would total 23.09 hectares for plantain and 26.88 hectares for banana. By comparison the total area in plantain in the four western parishes is currently 288.5 hectares, while the area in banana in the four western parishes totaled 2,860 hectares in 1996 (see Table 7b).

Similarly the projected crop areas of yam acquiring planting material through the nursery each year represent a tiny fraction of the total crop area in yam in the four western parishes which stood at 2,405.9 hectares in 2000 (see Table 8).

5.5.3 Market Projections by Crop

Based on the planting material requirements by crop (see Table 14), the market by crop areas reaped as shown in Tables 17a-17c are converted into the projected market for quantities of seedlings and planting material which could be sold by the proposed R2RW plant nursery over the first ten (10) years of the project, as presented in Table 18. Table 18 also includes the projections for sales of seedlings of fruit tree crops, ornamentals and timber and forestry species for the project.

Vegetables and Condiments

As shown in Table 18, the seedling market for scotch bonnet peppers is projected to increase from 74,287 seedlings in year 1 to 115,145 seedlings by year 10, while the seedling market for sweet peppers including yellow and red sweet pepper is projected to increase from 32,417 seedlings in year 1 to 50,246 seedlings by year 10. The seedling market projections for cabbage increase from 27,572 in year 1 to 42,737 in year 10; for tomato from 20,036 in year 1 to 31,055 in year 10; and for broccoli from 13,495 in year 1 to 20,918 in year 10.

Plantain and Banana

Based on Table 18, the market for the sale of plantain and banana suckers is projected to increase from a total of 6,504 suckers in year 1 to 10,080 suckers in year 10.

Yams

The market for the sale of yam mini-setts is projected to increase from 35,575 setts in year 1 to 55,141 setts in year 10. It should be noted that sale of yam mini-setts will be to contract farmers in the GRW growing seed yams for planting material.

Fruit Tree Crops

The market for fruit tree crop seedlings has been projected conservatively at only 1% of the annual island-wide planting targets under the Fruit Tree Crop Project of the Ministry of Agriculture (see Section 4.3.2 above) in years 1-2 while the Fruit Tree Crop Project is still providing free seedlings to farmers. This would represent only 5.7 hectares of fruit trees annually in years 1-2. It is projected that this market would double to 11.3 hectares of fruit trees annually in years 3-10 after the Fruit Tree Crop Project has ended. At an average planting density of approximately 312 seedlings per hectare, this would imply an annual market of 1,770 fruit tree crop seedlings for the

R2RW plant nursery in years 1-2, rising to 3,541 seedlings per year in years 3-10 as shown in Table 18.

Ornamentals

As described in Section 5.3.6 above, the market for ornamental seedlings for the R2RW plant nursery will be very limited, and has been projected conservatively at only 936 seedlings per annum or 10 seedlings per week. Moreover these sales will not be to farmers but directly to end-markets including hotels and householders and would typically be produced based on requests made to the nursey.

Timber and Forestry

For timber and forestry seedlings, the potential market for the R2RW plant nursery has been limited conservatively to the pool of actual requests for seedlings from the western parishes, who are seeking to establish some 840 hectares in timber and forestry (see Sections 4.3.3 and 5.3.7 above). A recent socio-economic study carried out by the Forestry Department in the Rio Minho Watershed indicated that while 91% of participating farmers would be willing to plant trees if provided with free seedlings, only 66% would be willing to pay for seedlings (at the prevailing price of J$10-15 per seedling charged by the Forestry Department). However as sufficient data is not available to construct a full demand curve for timber and forestry seedlings, and based on the feedback from the market received during the feasibility study, it is conservatively projected that only 1% of the farmers and land holders requesting seedlings will be willing to pay for timber and forestry seedlings at commercial prices. At an average planting density of 1,000 seedlings per hectare, this would translate to a market of 8,398 timber and forestry seedlings per annum for the nursery.

5.5.4 Achievement of Market Projections

It should be noted that for vegetable crops and condiments the market acceptance rate (i.e. that percentage of crop area reaped by farmers who purchase seedlings rather than produce their own seedlings in nursery beds) represent very small fractions of the total crop areas for each crop within the project area of marketing influence (the four western parishes of St. James, Hanover, Westmoreland and St. Elizabeth). The achievement of these minimal acceptance rates among farmers will depend on collaboration with other agencies such as RADA (see below) in disseminating the benefits of the R2RW plant nursery to farmers in the GRW and western parishes. It is likely that a gradual approach will see farmers establishing limited plots with commercial seedlings on individual farms to evaluate for themselves the costs and benefits versus self-propagation.

It should also be emphasized again that the various market estimates for the selected crops as detailed in Section 5.3 above are all far lower than either the actual annual production figures (see Table 13) or the estimated total aggregate demand for the selected crops based on domestic production and imports (see Table 12). This means that neither the market for the final crops nor the production capacity of the project area are constraints on the ability of the proposed R2RW plant nursery to sell seedlings and other planting materials for vegetable crops, condiments, plantain, banana and yam. The only effective constraint on the market for seedlings and planting materials for these crops produced by the nursery is the acceptance rate by farmers in the GRW and western parishes.

5.6 Marketing Plan

The Marketing Plan for proposed R2RW plant nursery will seek to inform farmers in the project area on the most cost-effective basis and within the resources available to the proposed R2RW plant nursery.

It should be noted that the scale of the project does not permit the employment of full-time marketing staff or the allocation of significant expenditure for a marketing budget. Consequently the proposed R2RW plant nursery will seek to maximize collaboration with existing agencies with extension services and outreach capabilities, including the Ministry of Agriculture, RADA and the Jamaica Agricultural Society (JAS), to increase awareness of the R2RW plant nursery and to encourage farmers to purchase seedlings and planting material from the project. The proposed plant nursery also will benefit from association with the overall R2RW project in the Great River watershed, particularly by inclusion in the public awareness programme. In this regard, the support of the Great River Watershed Management Committee Task Force on Production and Marketing can play an invaluable role in promoting the benefits of the project to farmers in the region. It should also be borne in mind that the marketing outreach will have to extend beyond the boundaries of the GRW itself to access the major agricultural producing areas of the other western parishes, particularly St. Elizabeth.

The elements of the marketing plan will include the following:

- Sales calls in person and by telephone to farmers in and around the GRW project area
- Development of collateral material for the proposed R2RW plant nursery including a brochure, as well as price lists and flyers tailored to specific occasions
- Limited advertising in local print media
- Public relations in the form of news stories, articles and press releases on the proposed R2RW plant nursery

The range of marketing elements outlined above are brought together and combined in the outline start-up marketing plan for proposed R2RW plant nursery presented in Table 19 below. The start-up marketing plan describes the main specific activities for each marketing element for the first six (6) months during the implementation of the proposed R2RW plant nursery, and outlines the timing for implementation and provisional costing for each activity.

Table 19 Start-Up Marketing Plan

Activity	Time Frame (Weeks)	Projected Cost (J$)
1. Finalize marketing plan for proposed R2RW plant nursery	Weeks 1 – 6	0
2. Design and print new brochure and fact sheets	Weeks 14 – 18	20,000
3. Development and placing of print advertising	Weeks 17 – 26	36,000
4. Co-ordinate sales calls	Weeks 19 – 26	10,000
5. Develop and implement public relations campaign	Weeks 20 – 26	10,000
TOTAL (J$)	Weeks 1 – 26	76,000
TOTAL (US$)	Weeks 1 – 26	1,652

6.0 ORGANIZATION AND MANAGEMENT

The organizational structure and management aspects of proposed R2RW plant nursery are analysed in this Section 6.0 of the Feasibility Study.

6.1 Management Objectives

The main management objectives during the implementation and operating stages of the project are as follows:

i. The first management objective is to complete implementation of the project within the minimum budgeted time. The time planned for the completion of implementation of the project is six (6) months from the preparation of the Feasibility Study.

ii. Completion of implementation of the plan within the targeted investment budget (see Section 7.1 below).

iii. Design and implementation of marketing plan as contained in Section 5.6 above.

iv. Operation of the nursery within technical plan.

v. Achievement and maintenance of targeted income and expenditure levels (see Section 7.3).

6.2 Organizational Structure - Options

6.2.1 Analysis of Options

The following are the main forms of legal organization for productive enterprises and other entities in Jamaica:

1. Sole Proprietorship
2. Partnership
3. Company Limited by Share Capital
4. Company Limited by Guarantee
5. Industrial and Provident Society
6. Friendly Society
7. Co-operative Society

However several of these legal forms would not be suitable as options for the proposed R2RW plant nursery project for the following reasons:

Legal Form of Organization	Reasons for Unsuitability
Sole Proprietorship	▪ Only one person as owner ▪ Unlimited liability
Partnership	▪ Unlimited liability
Company Limited by Guarantee	▪ Net Income may not be transferred to the benefit of directors or members
Friendly Society	▪ Objectives are to provide financial assistance to members from contributions

It should be noted that other forms of legal identity such as those established by specific legislation (e.g. for statutory companies) have not been included, as it is unlikely that the small

scale and limited time frame for implementation of the R2RW plant nursery project will permit such options to be feasible.

Of the remaining forms, it is recommended that the proposed R2RW plant nursery project should be established as a company limited by share capital for the following reasons:

1. Flexibility of Establishment and Operation

A company limited by share capital offers advantages in flexibility of establishment and operation over provident societies and cooperatives. The degree of ownership participation may be more precisely defined in discrete units and may be attached to an organization or individual (see below). The minimum number of shareholders is two (2), as opposed to a minimum of seven (7) members for provident societies and ten (10) members for cooperatives. A company limited by share capital is also a more conventional vehicle for sourcing funding from financial institutions, should this be required by the R2RW nursery project.

2. Eligibility for Income Tax Exemption

A company engaged in agriculture is eligible for exemption from the payment of income tax (see Section 6.4.1 below). This benefit is also available to provident societies and cooperatives. A company limited by share capital therefore is on equal footing with these options in this regard, while providing other advantages which provident societies and cooperatives do not provide.

3. Congruence of Form and Objectives

A company limited by share capital provides a greater congruence between the organizational form and the objectives of the R2RW plant nursery than the other options. Provident societies and cooperatives are established to provide various types of benefits to their members and typically involve regular contributions or dues from members. As it is proposed that the R2RW plant nursery will be a long-term sustainable enterprise which will depend on the generation of financial surpluses for its survival, it is more appropriate for the nursery to be structured as a profit-making company.

4. Ownership by Organizations

Provident societies and cooperatives are typically formed by an association of individual members, who have a single vote in the direction of the organization regardless of their individual inputs. However it is proposed that the ownership of the R2RW plant nursery may involve participation by other organizations (see below) as opposed to individual persons. A company limited by share capital allows for ownership of shares by organizations or by individuals and is thus more appropriate for the project.

6.2.2 Potential Participants in Ownership

It is proposed that the R2RW plant nursery will be established with participation by stakeholders who may be potential partners in its ownership. A number of potential partners are analysed below with respect to their potential participation in the ownership of the proposed R2RW plant nursery.

Social Development Commission

The Social Development Commission (SDC) has a precedent in assuming an ownership role in community-based projects, particularly projects funded through the SDC. However the SDC is presently in the process of relinquishing the role of ownership in favour of direct ownership of community-based projects by CBOs. In addition the responsibility for ownership in community

economic enterprises has been devolved from the SDC to the Ministry of Industry, Investment and Commerce. At this time therefore the SDC is not considered to be an appropriate candidate for participation in the ownership of the proposed R2RW plant nursery.

Jamaica Agricultural Society

The Jamaica Agricultural Society (JAS) is a membership association of farmers island-wide, with branches in every parish. The JAS is involved in commercial activities including operating a number of farm stores and farmers markets including a farmers market at Montpelier, St. James. The JAS also engages in extension services to farmers and stages seminars and farm shows. However the JAS has not engaged in direct farming or nursery projects in the past, and its track record in operating commercial ventures efficiently is not strong.

The JAS is nevertheless recommended as a candidate for participation in the ownership of the proposed R2RW plant nursery for the following reasons:

- The members of the JAS will be important potential purchasers of seedlings and planting material from the R2RW plant nursery, particularly for vegetables and condiments, plantain, bananas and yam (see Section 5.3 above)

- The members of the JAS are farmers possessing knowledge of agricultural production and markets

- The JAS is already a legal entity of long standing capable of taking ownership of shares in the nursery company

- Under the proposed management structure (see Section 6.4.1 below) the JAS will not be required to play a role in the day-to-day management of the nursery

Sandals/RADA/Mafoota Farmers Group

The Sandals/RADA/Mafoota Farmers Group comprises a number of farmers in the Mafoota community who have entered into marketing arrangements with the assistance of RADA to supply the Sandals hotels in Montego Bay with a range of exotic and local vegetables. Presently in the Mafoota area there are approximately 28 hectares under cultivation including some 18 hectares of exotic vegetables, with some 10-14 farmers active in the group. The farmers have commenced the process of registering as a cooperative society, but do not yet exist as a separate legal entity.

The Sandals/RADA/Mafoota Farmers Group is recommended as a candidate for participation in the ownership of the proposed R2RW plant nursery for the following reasons:

- The Sandals/RADA/Mafoota Farmers Group will be an important potential purchaser of seedlings from the R2RW plant nursery, particularly for vegetables and condiments (see Section 5.3.1 above)

- The members of the group are farmers possessing knowledge of agricultural production and markets

- The group has already commenced the process of forming a legal entity capable of taking ownership of shares in the nursery company

- Participation in the ownership in the nursery will contribute to building the capacity of the group and have a demonstration effect as a model to other potential farmers groups and CBOs in the GRW and project area

Montpelier Citrus Company

The Montpelier Citrus Company (MCC) is a private company which owns and operates the citrus nursery at Monteplier, St. James, as well as operating the 1,700 acre citrus farm formerly of the Jamaica Orange Company. The MCC has the technical and administrative capacity to manage a seedling nursery, even for crops other than citrus. However, it is unlikely that the MCC would consider an equity investment in a project such as the proposed R2RW plant nursery which is outside its core business of citrus farming and processing. At this time therefore the MCC is not considered to be an appropriate candidate for participation in ownership of the proposed R2RW plant nursery. However it is proposed that the MCC will provide professional nursery management under a cost-sharing arrangement with the R2RW plant nursery (see Section 6.4.1 below).

ESOP

An Employee Share Ownership Plan (ESOP) is an employee benefit programme governed and regulated by the ESOP Act 1994, under which a trust holds company shares on behalf of the employees who are participants in the ESOP. An ESOP may include full-time and part-time employees. An ESOP is recommended as a candidate for participation in the ownership of the proposed R2RW plant nursery for the following reasons:

- Participation in an ESOP provides an incentive to employees and increases long-term commitment to the project

- Shares in an ESOP may be redeemed by the company upon termination of employment of a participating staff member

Other Community-Based Organizations

In addition to the Sandals/RADA/Mafoota Farmers Group, other CBOs or farmers groups in the GRW and project area should be considered for participation in the ownership of the proposed R2RW plant nursery once they satisfy the following criteria:

- Organized as legal entities
- Purchase seedlings and planting material from the R2RW plant nursery

The degree of ownership participation of such CBOs or farmers groups may be linked to the volume of purchases which they make from the R2RW plant nursery.

Great River Watershed Management Committee

The Great River Watershed Management Committee (GRWMC) will play an important role in the implementation of the overall R2RW project and in the long-term management of the GRW. However the GRWMC is not a legal entity which can own shares in the R2RW plant nursery. Consequently although the Committee can play an important role in increasing public awareness and support for the project, the GRWMC is not considered to be a potential candidate for participation in ownership of the proposed R2RW plant nursery.

6.3 Review of Community Nurseries

The data collection and interviews carried out during the preparation of the Feasibility Study revealed several references to community nurseries in Jamaica. During interviews with industry sources, references also were made to previous attempts to establish collaborative approaches to seedling production.

6.3.1 Examples of Community Nurseries: 1994-2001

A summary of the main references to examples of various types of community nurseries implemented in Jamaica over the period 1994-2001 is presented in Table 20 below.

It may be noted that the majority of the projects listed (6 out of 10) were actually implemented by organizations such as NGOs, a donor agency and a tertiary agricultural institution, and only four (4) projects (those implemented in St. Thomas, Bluefields, Maggotty and Buff Bay) were implemented by community-based organizations (CBOs).

Under the Agricultural Export Services Project funded by USAID in the 1990s, a component of the project included the propagation of seedlings for peppers and callaloo by selected farmers on a scale large enough to meet the requirements of other farmers participating in the project. However, this did not involve a truly co-operative structure, as the farmers selected for seedling propagation carried out seedling production on individual plots with funding provided by the project. Nor did this approach continue after the funding for the project came to an end.

Another reference is to the seedling nursery established at Brook Lodge by the Jamaica Conservation and Development Trust (JCDT) under the Reforestation Project in the Blue and John Crow Mountains National Park with funding by the European Union. This involves a small seedling nursery of approximately 390 sq. m. (4,200 sq. ft.), producing primarily hardwood and fruit tree crop seedlings such as mahogany, cedar and peach, as well as a smaller quantity of ornamentals. This particular project is presently in transition as the donor funding by the EU comes to an end, and a viable long-term structure is being sought which would involve the participation of the Local Advisory Committee of the Blue and John Crow Mountains National Park (BJCMNP) and the Community Development Committee established under the Social Development Commission (SDC).

It may be noted that in most plant nurseries in Jamaica there is typically a differentiation of tasks by gender, with the field operations being carried out by male laborers and the tasks of potting being carried out by females.

6.3.2 Lessons From Experiences of Community Nurseries

As the table shows, most of the community nursery projects have not been successful, and the nurseries have not survived. In fact, it may be noted that of the three (3) projects which may be judged to have been successful to date, one was implemented by an NGO, another by CASE, and only one successful project was implemented by a CBO (BUBADAC).

The main problems cited in respect of community nurseries which have contributed to their failure include the following:

- Inadequate technical and managerial capabilities of the organizations responsible for the operation of the nurseries
- The lack of a co-operative tradition among farmers in Jamaica
- Lack of long-term commitment by community members to nurseries established under donor-funded projects
- Self-interest among participating community members overriding collaboration
- Dishonesty in management (one project)

- Praedial larceny (one project)

It is also instructive to look at the examples of those nursery projects which have succeeded, and the factors which may have contributed to their success. The most important factor which is common to all these projects is that they each had linkage to the technical and managerial capabilities required for nursery operations. In the case of the projects implemented at Hope Gardens and Passley Gardens by the National Arboretum Foundation and the College of Agriculture, Science and Education (CASE) respectively, the implementing agencies are themselves repositories of technical knowledge which would benefit the nurseries directly. In the case of the project in Buff Bay, the seedling nursery was established at the Gideon Education Centre, a religious school in Buff Bay, on the property of the Chairman of the school. The Chairman has agricultural training and provides direct supervision to the project. The project also has established a linkage to CASE which further strengthens its access to technical support.

The seedling nursery established by the JCDT with funding by the EU is also relevant to the proposed R2RW plant nursery, as an example of a nursery project making a transition from donor funding to long-term sustainability. The role played by the JCDT as an established NGO has included technical and managerial supervision, as well as providing an organizational structure with the legal status and capacity to take ownership of the capital assets provided by the donor in the implementation of the project, including motor vehicles.

6.4 Implementation and Management

6.4.1 Recommended Organizational Structure

Legal Status

As noted under Section 6.2.1 above, it is recommended that the R2RW plant nursery will be organized as a Company Limited by Share Capital. Under the provisions of the Income Tax Act, companies which derive their income from agriculture are eligible for exemption from the payment of income tax for a period of ten (10) years, with the exemption being renewable. It is proposed therefore that the R2RW plant nursery will apply for income tax exemption after company formation.

The nursery may be established with an authorized share capital allowing for long-term expansion of share ownership. Capital contributions by USAID/R2RW in excess of authorized share capital will be entered to the capital reserve of the company. Initially a minimum of two (2) shares must be issued, e.g. to USAID and Associates in Rural Development, Inc., as nominal shareholders Thereafter additional shares may be issued to appropriate participants in ownership (see Section 6.2.2 above) over the remaining two (2) years of implementation of the overall R2RW project (which will be the first 2 years of the nursery project). At the end of the R2RW project, the shares held by the initial nominal shareholders may be assigned to appropriate participants in ownership. This structure will enable expansion of ownership and issuance of shares without incurring any transfer tax or other costs other than the initial company formation costs and stamp duty on the authorized share capital. However transfer tax would be applicable on any subsequent transfer of shares from an existing shareholder to another participant in ownership of the plant nursery company.

Board of Directors

It is proposed that the Board of Directors of the plant nursery company will include the following:

- Representatives of the NGOs, CBOs and farmers groups which are participants in ownership in the R2RW plant nursery company

- A representative of an ESOP (if applicable)

- Other suitable persons nominated by the shareholders and the Production and Marketing Task Force of the GRWMC, and elected by the shareholders

The following statutory officers of the Board of Directors will be elected by the members of the Board from their numbers:

- Chairman
- Secretary
- Treasurer

The responsibilities of the Board of Directors will include the following:

- Overall supervision of nursery project
- Supervision of farm manager
- Selection of crops and production targets
- Recruitment and termination of staff
- Auditing and statutory compliance
- Securing financial resources
- Dividend and investment policy

Management and Staffing

It is proposed that the day-to-day management of the R2RW plant nursery will be carried out by a trained and experienced plant nursery manager, under a cost-sharing agreement with the Montpelier Citrus Company which presently employs a full-time plant nursery manager for their citrus seedling nursery located adjacent to the proposed site of the R2RW plant nursery.

The required staffing for the R2RW plant nursery is outlined below:

Position	Number
Nursery Manager *	1
Security Guards	2
Workers: Nursery/Potting/Other	8
Propagation Specialist	1
Total (Year 1)	**12**

* Nursery Manager salary shared with MCC

The responsibilities of the farm manager will include the following:

- Supervision of nursery staff
- Implementation of production plan
- Adherence to technical requirements
- Marketing and sales

The proposed organizational structure of the R2RW plant nursery is set out below in Figure 5.

6.4.2 Roles of Agencies in Implementation and Management

It is proposed that a number of agencies will play important roles in the implementation and management of the proposed R2RW plant nursery. The main organizations and agencies which will be involved in the implementation and management of the project and the proposed roles which each agency will play are outlined below.

Agency	Roles
R2RW/USAID	▪ Responsibility for providing core funding and for securing additional financing for the project ▪ Procurement and installation of equipment and supplies ▪ Negotiations for lease of project site ▪ Recruitment and training of staff ▪ Negotiations with MCC for provision of plant nursery manager under cost-sharing agreement ▪ Establishment of proposed organizational structure
RADA	▪ Provision of marketing support to increase awareness of the R2RW plant nursery and to encourage farmers to purchase seedlings and planting material from the project ▪ Provision of technical support
Montpelier Agricultural Research Station	▪ Supplier of improved strains of scotch bonnet seeds ▪ Provision of technical advice on propagation of scotch bonnet seeds ▪ Negotiations for lease of project site
Montpelier Citrus Company (MCC)	▪ Provision of trained and experienced plant nursery manager under cost-sharing agreement
Great River Watershed Management Committee	▪ Provision of marketing support through Task Force on Production and Marketing
Sandals/RADA/Mafoota Farmers Group	▪ Participation in ownership ▪ Purchase seedlings and planting material
Jamaica Agricultural Society (JAS)	▪ Participation in ownership ▪ Purchase seedlings and planting material
Other Community-Based Organizations (CBOs)	▪ Participation in ownership ▪ Purchase seedlings and planting material
Knockalva Secondary and Vocational Training Complex	▪ Provision of technical support

6.5 Implementation Schedule

The following Table 21 is an outline implementation schedule outlining the various activities involved in the implementation of the proposed R2RW plant nursery project, along with the estimated timetable for completion of each activity. The implementation schedule is also

presented in graphical form in Figure 6 below. It is projected that the entire process of implementation will require approximately 26 weeks or six (6) months.

Table 21 Implementation Schedule

Activity	Estimated Time Frame (Weeks)	Targeted Completion
Review of Feasibility Study	2 weeks	November 2001
Finalization of project structure	4 weeks	December 2001
Sourcing financing for project	9 weeks	December 2001 - January 2002
Finalization of land tenure	9 weeks	December 2001 - January 2002
Land clearing and preparation	4 weeks	February 2002
Procurement and shipping of nursery structures and equipment	4 weeks	February 2002
Construction and installation of nursery structures and equipment	4 weeks	March 2002
Procurement of planting material and supplies	5 weeks	April 2002
Recruitment and training of staff	5 weeks	April 2002
Procurement of planting material for plantain & banana	5 weeks	April 2002
Establishment of plantain & banana and yam mini-sett propagation systems including contract farming	5 weeks	April 2002
Implementation of start-up marketing plan (see Table 19)	13 weeks	February – April 2002
Commencement of commercial operations by the new proposed R2RW plant nursery	2 weeks	May 2002
TOTAL		**November 2001 – May 2002 (26 weeks)**

7.0 FINANCIAL ANALYSIS

The Feasibility Study seeks to make projections for the proposed R2RW plant nursery and carry out an analysis of the financial viability of the project over the next ten (10) years from 2002-2011 on the basis of the project as defined in the previous Sections of the Study.

The financial analysis includes a budget of the estimated capital expenditure for the proposed R2RW plant nursery, and includes 10-year Financial Projections for Income and Expenditure Statements; Cash Flow; Sources and Uses of Funds; and Balance Sheet, as well as Ratio Analysis and Sensitivity Analysis. All figures are in United States dollars unless otherwise indicated. No provision has been made for inflation of revenues or costs (i.e. all financial values are in constant dollars). A fixed exchange rate of J$47.00:US$1.00 has been assumed over the period of the financial projections.

7.1 Project Investment Cost and Financing

Financial Table 1 details the components of the total capital expenditure for the proposed R2RW plant nursery, which is estimated at US$100,055 (J$4,702,589). The main expenditure is for nursery construction which is estimated at US$43,293 (J$2,034,788), including the cost of a shade house at US$18,191 (J$854,988) and the proposed screen house at US$10,838 (J$509,400). The cost of irrigation equipment is estimated at US$4,427 (J$208,057), including the cost of a misting propagator. The cost of nursery materials and equipment is estimated at US$13,680 (J$642,955), including the cost of miscellaneous small tools and equipment. The budget for perimeter fencing is estimated at US$17,547 (J$824,691) and at US$5,106 (J$240,000) for internal roadway works. Land preparation costs for the nursery are estimated at US$1,277 (J$60,000). Provision is made for start-up marketing costs at US$1,617 (J$76,000), and for start-up development costs at US$1,064 (J$50,000). Working capital requirement is projected at US$7,644 (J$359,274). A contingency of US$4,401 (J$206,825) is included representing 5% of the capital cost items. The main items of capital expenditure are presented in detail in Financial Tables 1a-1c.

As shown in Financial Table 1, it is proposed that the total capital expenditure costs will be financed by funding of US$56,078 (J$2,635,670) or 56.05% of the total project cost from the USAID R2RW budget committed to the proposed R2RW plant nursery, and by new funding of US$43,977 (J$2,066,920) or 43.95% of the total project cost to be solicited from other sources such as the Jamaica Agricultural Development Foundation (JADF), over the period of implementation of the project. For the purposes of this study no financial costs have been included for the additional funding to be solicited.

The foreign exchange component of the total capital expenditure is projected at US$42,238, or 42.21% of the total capital cost (see Financial Table 2).

7.2 Projected Production and Annual Income

Total annual production by the proposed R2RW plant nursery as shown in Financial Table 4 is projected to rise from 295,651 units in year 1, to 323,983 units in year 2 and to 453,441 units in year10, where units include seedlings, suckers and mini-setts.

The total annual production of seedlings for vegetables and condiments and suckers for plantain and banana are based on the estimated acceptance rates in annual crop area reaped in the GRW and the project area as set out in Tables 16a and 16b (see Section 5.5 above). The total annual production of yam mini-setts is based on the maximum production capacity of the nursery as an upper bound on its output, as the potential market for yam mini-setts is greater than the potential production of the nursery. It should be noted that the projections in the study for yam

mini-setts are for sales to contract farmers who will grow out the setts into seed yams as planting material for yam farmers in the GRW and project area. The projections for total annual production of seedlings for fruit tree crops, ornamentals, timber and forestry species are based on the market assumptions set out in Table 18 (see Section 5.5 above).

Financial Table 4b presents a Production Capacity Analysis, which shows that the annual production is projected at 36.4% of the total maximum production capacity of the nursery in year 1, rising to 39.9% production capacity utilization in year 2, and to 55.79% production capacity utilization in year 10.

Total Annual Income for the proposed R2RW plant nursery is shown in Financial Table 5, based on the annual production projections. A mortality rate of 10% is assumed for seedlings/suckers/setts produced by the nursery. Consequently the number of seedlings/suckers/setts sold is equal to the number of seedlings/suckers/setts produced annually less the 10% mortality rate.

The projected sales prices per unit for seedlings, suckers and mini-setts are also presented in Financial Table 5, based on prevailing market prices for seedlings, suckers and mini-setts by crop. On the basis of the annual production projections and the projected unit sales prices, the Total Annual Income for proposed R2RW plant nursery is estimated at US$86,853 (J$4,082,109) in year 1, rising to US$95,060 (J$4,467,835) in year 2 and at US$133,498 (J$6,274,412) in year 10.

7.3 Annual Expenditure

7.3.1 Direct Costs

The projected direct costs for the operation of the plant nursery are presented in Financial Table 4a, based on the annual production projections. The total direct costs including potting mix, seedling bags, soil, sand, manure, fertilizer, fungicide, pesticide, sawdust, and planting material are projected at US$15,698 (J$737,818) in year 1, rising to US$17,025 (J$800,157) in year 2 and at US$24,341 (J$1,144,036) in year 10. The detailed assumptions for each item of direct cost are included in the notes to Financial Table 4a.

7.3.2 Planting Material

The cost of planting material for the proposed plant nursery is detailed in the notes to Financial Table 4a. Seeds for the selected vegetables and condiments are readily available from local commercial suppliers such as Agro Grace Limited, or directly from major suppliers in the United States. Plantain and banana suckers will be obtained by vegetative propagation from initially imported stock. Yam mini-setts will be prepared from yams purchased at farmgate prices from yam farmers within the GRW and project area. Seeds for scotch bonnet pepper will be obtained from the Montpelier Research Station where improved strains are being developed under a project funded by the Food and Agriculture Organization (FAO).

The sourcing of planting material for seedling production of fruit tree crops is more complex, as these crops are propagated either from collection of seeds in the field, by grafting, or by a combination of these methods. For the proposed R2RW plant nursery, it is assumed for the purposes of the Feasibility Study that the techniques of grafting and transposing plant propagules will be carried out by a plant propagation specialist to be trained and employed by the project. Consequently the sources of planting material for fruit tree crops will be by collection of seeds from farmers and food processors (particularly ackee and mango) and grafting from mother wood fruit trees to be identified and accessed within the GRW and project area.

Planting material for seedling production of ornamentals will be sourced from other ornamental nurseries, from grafting from mother plants, and even from tissue-cultured material from the genetic bank of the Scientific Research Council (SRC). Planting material for production of timber and forestry seedlings will be by collection of seeds from the field and from land holders within the GRW.

7.3.3 Total Annual Expenditure

Total Annual Expenditure for the project is estimated at US$91,730 (J$4,311,289) in year 1, rising to US$93,930 (J$4,414,732) in year 2 and US$118,576 (J$5,573,087) in year 10 (see Financial Table 6). Total annual expenditure including direct costs and overheads is estimated at 105.61% of total sales revenue in year 1, 98.81% in year 2 and 88.82% in year 10. The detailed assumptions for each item of overhead cost are included in the notes to Financial Table 6. Financial Table 3 shows the projected depreciation and amortization schedule on a straight-line basis over the first ten (10) years of the project.

7.4 Projected Financial Statements

The pro forma ten (10) year financial statements for the project as presented in this section are based on the financing and operating assumptions set out above.

7.4.1 Pro Forma Ten (10) year Income Statement

Financial Tables 6 and 7 present a projected ten (10) year income statement and vertical analysis for the project. The Annual Net Income for the project is estimated at a deficit of -US$4,876 (-J$229,180) in year 1 of the project, moving to a positive US$1,130 (J$53,103) in year 2 and to an estimated annual net income of US$14,922 (J$701,325) in year 10 of the project. The project is estimated to generate a cumulative positive net balance of US$99,314 (J$4,667,764) by the end of year 10. No provision has been made for payment of taxes on company profit, based on the proposed application for tax exemption for proposed R2RW plant nursery.

7.4.2 Pro Forma Ten (10) year Cash Flow

Financial Table 8 presents a projected ten (10) year cash flow for the project. The operating net cash flow is projected at US$4,028 (J$189,303) in year 1, moving to US$10,034 (J$471,586) in year 2, and an estimated annual net cash flow of US$23,826 (J$1,119,808) by year 10 of the project. The project is estimated to generate a cumulative cash balance of US$195,997 (J$9,211,869) by the end of year 10.

7.4.3 Pro Forma Ten (10) year Balance Sheet

Financial Table 9 presents a projected ten (10) year balance sheet for the project. The net worth of proposed R2RW plant nursery is estimated to rise from US$91,807 (J$4,314,925) in year 1, to US$92,937 (J$4,368,028) in year 2 and to a total estimated net worth of US$195,997 (J$9,211,869) by year 10. The main assets of proposed R2RW plant nursery are the current assets, including cash and short-term investments. No distribution of dividends is assumed over the period of the projections.

7.4.4 Pro Forma Ten (10) year Sources and Uses of Funds

Financial Table 10 presents a projected ten (10) year sources and uses of funds statement for the project. As shown in this table, the total source of funds including net income plus depreciation, is projected at US$10,034 (J$471,586) in years 1-2 and at US$23,826 (J$1,119,808) in years 9-10. The main use of funds will be to increase the cash component of current assets.

7.5 Ratio and Sensitivity Analysis

7.5.1 Ratio Analysis

Financial Table 11 presents a ratio analysis of proposed R2RW plant nursery over the 10-year period covered by the Feasibility Study. The Net Present Value (NPV) of the project over 10 years is estimated at US$2,974 (J$139,756) at a real discount rate of 12.00%, while the Internal Rate of Return (IRR) is estimated at 12.71%. The total Return on Assets (ROA) is projected at an annual average of 6.71% over years 1-10. The total Return on Investment (ROI) is projected at an annual average of 18.82% over years 1-10. The total Return on Income projected at an annual average of 8.15% over years 1-10. These ratios reflect the viable levels attained by the financial projections for the project over the first ten (10) years.

7.5.2 Sensitivity Analysis

As shown in Financial Table 12, the project will be relatively sensitive to increases in its operating costs, with a 10% increase in total operating expenses producing a -93% decline in estimated net income in year 4, all other factors being constant. The project is even more sensitive to fluctuations in its projected income levels, with a 10% decline in estimated income producing a -103% decline in estimated net income in year 4.

8.0 CONCLUSION

The Feasibility Study as structured in this proposal will generate adequate income to fund the operating costs of proposed R2RW plant nursery over the 10-year period covered by the plan. However the projections are conservative and the proposed R2RW plant nursery will have to adopt a sustained marketing plan to maintain targeted income levels.

TABLES

Table 1 Land Capability: Project Area

Parish	CLASS I	CLASS II	CLASS III	CLASS IV	CLASS V	CLASS VI	CLASS VII	TOTAL
St. James	688	5,119	5,504	7,548	6,313	30,089	182	55,443
Hanover	352	6,208	6,556	7,649	7,293	17,655	2,367	48,080
Westmoreland	2,182	19,024	10,001	9,281	7,902	26,802	1	75,193
St. Elizabeth	2,223	20,160	27,884	1,349	11,868	39,722	2,023	105,229
Total: Project Area	5,445	50,512	49,945	25,826	33,377	114,267	4,574	283,945
Total: %	1.92%	17.79%	17.59%	9.10%	11.75%	40.24%	1.61%	100.00%

Unit: Hectares
Source: University of the West Indies

Legend

CLASS I level land with no factors limiting agricultural cultivation
CLASS II Suitable for cultivation with slight limitations
CLASS III Suitable for cultivation with major limitations
CLASS V Non-arable land
CLASS VI Non-Arable land which should never be cleared of natural vegetation
CLASS VII Land of no productive agricultural use

Parish (Acres)	CLASS I	CLASS II	CLASS III	CLASS IV	CLASS V	CLASS VI	CLASS VII	TOTAL
St. James	1,700	12,650	13,600	18,650	15,600	74,350	450	137,000
Hanover	870	15,340	16,200	18,900	18,020	43,625	5,850	118,805
Westmoreland	5,392	47,009	24,712	22,934	19,527	66,227	2	185,803

Parish (Acres)	CLASS I	CLASS II	CLASS III	CLASS IV	CLASS V	CLASS VI	CLASS VII	TOTAL
St. Elizabeth	5,492	49,816	68,901	3,333	29,327	98,152	5,000	260,021
Total: Project Area	13,454	124,815	123,413	63,817	82,474	282,354	11,302	701,629
Jamaica								

Table 2a All-island Estimates of Crop Area Reaped: 1991 – 2000

Crop Group	1,991	1,992	1,993	1,994	1,995	1,996	1,997	1,998	1,999	2,000	% Change 1991-2000
Legumes	9,001	10,227	9,418	9,766	8,742	8,395	7,570	6,853	6,295	5,203	-42.2%
Vegetables	9,264	9,762	10,364	11,695	12,253	12,484	10,220	10,050	10,234	9,230	-0.4%
Condiments	1,978	2,890	3,173	3,816	3,807	3,785	2,951	3,251	3,315	2,415	22.1%
Fruits	1,214	1,516	2,038	2,216	2,033	2,248	2,150	2,329	1,975	1,812	49.3%
Cereals	2,712	2,911	2,267	2,917	2,862	2,959	2,716	1,938	1,774	1,553	-42.7%
Plantains	1,967	1,834	2,092	2,079	2,024	2,031	1,635	1,375	1,624	1,315	-33.1%
Potatoes	2,433	2,398	2,511	2,765	3,173	2,963	2,389	2,283	2,034	1,678	-31.0%
Yams	13,917	13,980	13,781	14,541	14,305	14,989	13,442	12,423	11,951	9,530	-31.5%
Other Tubers	2,891	2,879	3,118	2,922	2,865	3,286	2,502	2,301	2,499	2,063	-28.6%
Sorrel	569	569	660	610	709	719	636	640	622	590	3.7%
Grand Total	**45,946**	**48,966**	**49,422**	**53,327**	**52,773**	**53,859**	**46,211**	**43,443**	**42,323**	**35,389**	**-23.0%**

Units: Hectares
Source: Data Bank and Evaluation Division, MINAG

Table 2b All-island Estimates of Crop Production: 1991 – 2000

Crop Group	1,991	1,992	1,993	1,994	1,995	1,996	1,997	1,998	1,999	2,000	% Change 1991-2000
Legumes	8,422	11,278	11,144	11,515	10,463	10,060	8,614	7,400	7,303	5,586	-33.7%
Vegetables	101,199	124,198	147,418	171,955	183,873	192,449	145,923	148,289	161,934	141,102	39.4%
Condiments	10,224	21,274	26,442	38,414	37,439	36,624	25,475	29,037	34,425	30,606	199.4%
Fruits	19,320	29,360	45,178	49,159	45,226	50,542	46,070	51,534	42,807	37,765	95.5%
Cereals	3,491	4,357	3,568	4,078	3,898	4,074	3,150	2,228	2,165	1,781	-49.0%
Plantains	26,692	28,469	35,811	35,374	34,769	33,831	26,340	22,489	27,524	22,332	-16.3%
Potatoes	25,007	30,727	35,897	41,011	47,596	46,993	35,975	35,784	32,666	26,555	6.2%
Yams	186,104	214,387	221,928	233,921	240,371	253,371	212,567	198,402	195,688	147,709	-20.6%
Other Tubers	34,336	42,029	55,353	55,391	58,216	65,980	45,876	42,390	47,626	36,299	5.7%
Sorrel	624	838	978	880	1,101	1,127	938	1,032	1,019	795	27.4%
Grand Total	**415,419**	**506,917**	**583,717**	**641,698**	**662,952**	**695,051**	**550,928**	**538,585**	**553,157**	**450,530**	**8.5%**

Units: Hectares
Source: Data Bank and Evaluation Division, MINAG

Table 2c All-island Estimates of Crop Production per Hectare: 1991 – 2000

Crop Group	1,991	1,992	1,993	1,994	1,995	1,996	1,997	1,998	1,999	2,000	Average 1991-2000
Legumes	0.94	1.10	1.18	1.18	1.20	1.20	1.14	1.08	1.16	1.07	1.12
Vegetables	10.92	12.72	14.22	14.70	15.01	15.42	14.28	14.76	15.82	15.29	14.31
Condiments	5.17	7.36	8.33	10.07	9.83	9.68	8.63	8.93	10.38	12.67	9.11
Fruits	15.91	19.37	22.17	22.18	22.25	22.48	21.43	22.13	21.67	20.84	21.04
Cereals	1.29	1.50	1.57	1.40	1.36	1.38	1.16	1.15	1.22	1.15	1.32

Crop Group	1,991	1,992	1,993	1,994	1,995	1,996	1,997	1,998	1,999	2,000	Average 1991-2000
Plantains	13.57	15.52	17.12	17.01	17.18	16.66	16.11	16.36	16.95	16.98	16.35
Potatoes	10.28	12.81	14.30	14.83	15.00	15.86	15.06	15.67	16.06	15.83	14.57
Yams	13.37	15.34	16.10	16.09	16.80	16.90	15.81	15.97	16.37	15.50	15.83
Other Tubers	11.88	14.60	17.75	18.96	20.32	20.08	18.34	18.42	19.06	17.60	17.70
Sorrel	1.10	1.47	1.48	1.44	1.55	1.57	1.47	1.61	1.64	1.35	1.47
Grand Total	9.04	10.35	11.81	12.03	12.56	12.91	11.92	12.40	13.07	12.73	11.88

Units: Tonnes Per Hectare
Source: Data Bank and Evaluation Division, MINAG

Table 3 Comparative Estimates of Crop Production and Area Reaped by Parish: 1999 – 2000

Parish	Production (Tonnes)			Area Reaped (Hectares)		
	2,000	1,999	% CHANGE	2,000	1,999	% CHANGE
Kingston & St. Andrew	8,879	9,392	-5.5%	808	851	-5.1%
St. Thomas	15,371	19,120	-19.6%	1,487	1,802	-17.5%
Portland	14,662	17,084	-14.2%	1,172	1,343	-12.7%
St. Mary	14,698	16,073	-8.6%	1,009	1,180	-14.5%
St. Ann	27,186	40,994	-33.7%	2,231	3,165	-29.5%
Trelawny	76,089	103,718	-26.6%	5,846	7,419	-21.2%
St. James	19,735	22,701	-13.1%	1,358	1,475	-7.9%
Hanover	12,580	13,405	-6.2%	1,019	992	2.7%
Westmoreland	51,429	58,755	-12.5%	3,739	4,036	-7.4%
St. Elizabeth	100,520	110,802	-9.3%	8,986	10,518	-14.6%

Parish	Production (Tonnes)			Area Reaped (Hectares)		
	2,000	1,999	% CHANGE	2,000	1,999	% CHANGE
Manchester	50,461	67,887	-25.7%	3,439	4,467	-23.0%
Clarendon	42,137	54,729	-23.0%	2,963	3,588	-17.4%
St. Catherine	16,783	18,497	-9.3%	1,332	1,487	-10.4%
Total	**450,530**	**553,157**	**-18.6%**	**35,389**	**42,323**	**-16.4%**

Source: Data Bank and Evaluation Division, MINAG

Table 4 Estimates of Area Reaped by Parish and Corp Group in Project Area: 2000

Crop Group	St. James	Hanover	Westmoreland	St. Elizabeth	Total	Total As % of Island
Legumes	105	63	359	3,137	3,664	70.4%
Vegetables	341	201	1,101	2,160	3,803	41.2%
Condiments	44	58	162	987	1,251	51.8%
Fruits	104	13	189	992	1,298	71.6%
Cereals	55	119	292	291	757	48.7%
Plantains	76	33	102	76	287	21.8%
Potatoes	16	10	189	361	576	34.3%
Yams	439	424	949	595	2,407	25.3%
Other Tubers	136	65	347	349	897	43.5%
Sorrel	42	33	49	38	162	27.5%
Total	1,358	1,019	3,739	8,986	15,102	42.7%

Units: Hectares
Source: Data Bank and Evaluation Division, MINAG

Table 5 Project Area; Farm Holdings by Size (1996)

Parish	Number of Holdings	Area of Holdings (Hectares)	Average Size of Holdings (Hectares)
St. James	9,050	16,166	1.79
Hanover	11,719	18,582	1.59
Westmoreland	18,489	40,140	2.17
St. Elizabeth	25,588	38,759	1.51
Total: Project Area	**64,846**	**113,647**	**1.75**
Jamaica	187,791	407,434	2.17

Source: Census of Agriculture (STATIN)

Table 6 Project Area: Farm Holdings by Land Use (1996)

Parish	Crops			Pasture		Timber & Forest	Ruinate & Fallow	Other Land	Total Project Area
	Pure Stand	Mixed Stand	Food Forest	Improved	Unimproved				
St. James	4,909	1,104	211	749	3,019	420	4,585	1,169	16,166
Hanover	3,978	2,642	668	1,927	3,750	460	3,982	1,175	18,582
Westmoreland	13,822	2,717	813	4,457	6,696	1,909	5,957	3,769	40,140
St. Elizabeth	10,602	2,387	566	6,179	4,986	705	10,230	3,104	38,759
Total: Project Area	**33,311**	**8,850**	**2,258**	**13,312**	**18,451**	**3,494**	**24,754**	**9,217**	**113,647**
Jamaica	127,735	41,803	8,042	47,369	48,280	8,863	87,300	38,042	407,434

Source: Census of Agriculture (STATIN)

Table 7a Project Area: Area of Holding under Crop Cultivation (1996)

Parish	Permanent Crops	Legumes	Vegetables	Condiments	Fruits	Cereals	Potatoes	Yams	Other Tubers	Other Crops	Total
St. James	6,249	51	208	50	157	62	39	502	137	14	7,469
Hanover	7,369	148	275	120	75	157	84	1,146	226	31	9,631
Westmoreland	17,291	333	511	110	151	450	150	935	351	61	20,343
St. Elizabeth	12,750	1,931	1,356	725	804	270	386	755	705	667	20,349
Total: Project Area	**43,659**	**2,463**	**2,350**	**1,005**	**1,187**	**939**	**659**	**3,338**	**1,419**	**773**	**57,792**
Jamaica	130,510	5,694	9,836	2,549	2,891	2,354	3,952	15,983	4,075	1,426	179,270

Table 7b Project Area: Area of Holdings in Permanent Crops (1996)

Parish	Avocado	Banana	Cocoa	Coconut	Coffee	Grapefruit	Orange	Ortanique	Mango	Pimento	Plantain	Sugar Cane	Other Crops
St. James	23	1,202	28	546	548	11	1,136	8	185	42	182	1,037	78
Hanover	64	717	117	689	76	9	240	244	269	433	197	1,701	351
Westmoreland	73	626	87	487	144	19	253	22	409	244	142	11,437	295
St. Elizabeth	27	315	29	164	174	11	242	10	410	337	48	3,154	230
Total: Project Area	**187**	**2,860**	**261**	**1,886**	**942**	**50**	**1,871**	**284**	**1,273**	**1,056**	**569**	**17,329**	**954**
Jamaica	759	16,075	7,026	13,883	10,807	717	10,261	830	3,259	5,061	4,581	53,294	3,951

Table 7c Project Area if Holdings in Legumes, Vegetables and Condiments (1996)

Parish	Red Peas	Other Legumes	Cabbage	Carrot	Pumpkin	Tomato	Other Vegetables	Hot Pepper	Sweet Pepper	Other Condiments
St. James	20	31	10	27	67	45	61	22	25	2
Hanover	100	49	31	13	138	45	48	69	43	6
Westmoreland	186	148	90	38	200	97	86	59	45	3

St. Elizabeth	416	1,514	102	439	245	364	204	55	167	506
Total: Project Area	**722**	**1,742**	**233**	**517**	**650**	**551**	**399**	**205**	**280**	**517**
Jamaica	2,117	3,587	1,942	2,327	2,383	1,880	1,290	708	829	1,008

Table 7d Project Area: Area of Holdings Fruits, Cereals and Tubers (1996)

Parish	Paw Paw	Pineapple	Water Melon	Other Fruits	Corn	Other Cereals	Irish Potato	Sweet Potato	Yellow Yam	Other Yams	Cassava	Other Tubers	Other Crops
St. James	4	153	1	0	59	3	1	37	236	266	44	94	14
Hanover	12	50	7	4	156	1	6	78	560	586	44	183	31
Westmoreland	9	134	7	1	301	150	11	139	403	533	90	261	61
St. Elizabeth	78	199	491	35	254	14	18	369	514	242	478	227	667
Total: Project Area	**103**	**536**	**506**	**40**	**770**	**168**	**36**	**623**	**1,713**	**1,627**	**656**	**765**	**773**
Jamaica	1,002	1,153	646	87	2,091	257	720	3,234	10,506	5,477	1,756	2,323	1,428

Table 8 Estimates of Area Reaped by Parish and Crop Detailed in Project Area – Selected Crops 2000

Crop Detail	Area Reaped (Hectares)					Production (Tonnes)	Average Yield (Tonnes/Hectare)
	St. James	Hanover	Westmoreland	St. Elizabeth	Total		
Vegetables							
Cabbage	21.7	12.1	178.1	157.0	368.9	6,429.7	17.4
Cauliflower	0.6	0.0	0.0	76.0	76.6	1,018.0	13.3
Iceberg Lettuce	8.0	0.2	11.4	16.9	36.5	376.0	10.3
Pak Choi	40.1	16.2	19.8	8.7	84.8	1,153.9	13.6
Tomato	40.4	19.9	156.6	348.5	565.4	10,858.3	19.2
Broccoli	0.0	0.0	0.0	46.5	46.5	496.9	10.7

Crop Detail	Area Reaped (Hectares)					Production (Tonnes)	Average Yield (Tonnes/Hectare)
	St. James	Hanover	Westmoreland	St. Elizabeth	Total		
Condiments							
Hot Pepper	17.9	36.8	73.0	53.4	181.1	1,678.1	9.3
Sweet Pepper	23.9	18.2	70.8	145.3	258.2	3,524.2	13.6
Plantains							
Horse Plantain	50.4	29.2	75.9	53.3	208.8	3,553.0	17.0
Other Plantain	25.7	3.8	26.5	23.7	79.7	1,488.4	18.7
Yams	439.5	424.5	947.5	594.4	2,405.9	40,578.5	16.9

Source: RADA

Table 9 Estimates of Area Reaped by Extension Area and Crop Detail in Great River Watershed Area – Selected Crops 2000

Crop Detail	Area Reaped (Hectares)								Area Reaped in Rest of Project Area (Hectares)
	St. James				Hanover	Westmoreland	St. Elizabeth	Total GRW	
	Ext. Area 26 Latium	Ext. Area 27 Maroon Town	Ext. Area 28 Cambridge	Ext. Area 29 Montego Bay	Ext. Area 30 Miles Town	Ext. Area 36 Bethel Town	Ext. Area 38 New Market		
Vegetables									
Cabbage	2.4	5.1	12.8	1.4	3.7	40.5	71.0	136.9	232.0
Cauliflower	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.6	76.0
Iceberg Lettuce	0.0	6.8	1.2	0.0	0.2	0.0	0.0	8.2	28.3
Pak Choi	5.0	11.8	21.6	1.7	5.4	0.0	1.7	47.2	37.6
Tomato	7.0	15.8	14.8	2.8	4.6	28.0	71.0	144.0	421.4
Broccoli	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.5
Condiments									

Crop Detail	Area Reaped (Hectares)								Area Reaped in Rest of Project Area (Hectares)
	St. James				Hanover	Westmoreland	St. Elizabeth	Total GRW	
	Ext. Area 26 Latium	Ext. Area 27 Maroon Town	Ext. Area 28 Cambridge	Ext. Area 29 Montego Bay	Ext. Area 30 Miles Town	Ext. Area 36 Bethel Town	Ext. Area 38 New Market		
Hot Pepper	4.7	4.3	6.8	2.1	16.0	20.0	18.0	71.9	109.2
Sweet Pepper	5.8	3.6	12.6	1.9	3.5	17.0	27.3	71.7	186.5
Plantains									
Horse Plantain	10.0	9.9	12.3	18.2	3.8	28.0	30.5	112.7	96.1
Other Plantain	3.0	3.1	8.9	10.7	0.4	15.5	9.5	51.1	28.6
Yams	49.0	204.5	115.3	70.7	68.7	248.0	298.5	1,054.7	1,351.2

Source: RADA

Table 10 Planned Production in Project Area – Selected Projects

Project	Implementing Agency	Time Frame For Implementation	Crop Detail	Planned Production (Hectares)
Domestic Food Crop Project *	MINAG	2000/2001	Plantain	33
			Coco	8
			Dasheen	35
			Yam	0
			Tomato	10
			Sweet Pepper	4
			Hot Pepper	25
			Exotic Vegetables	0

Project	Implementing Agency	Time Frame For Implementation	Crop Detail	Planned Production (Hectares)
Fruit Tree Crop Project **	MINAG	2000 - 2002	Ackee	880
			Breadfruit	130
			Nutmeg	50
			Mango	140
			Soursop	80
			Guava	100
			June Plum	60
			Cashew	75
			Avocado	80
			Naseberry	50
			Tamarind	15
			Otaheite Apple	20
			Guinep	20
Reforestation Programme ***	Forestry Department	Ongoing	Timber & Forestry	840

* Domestic Food Crop Production & Marketing Project Targets for St. James, Westmoreland & St. Elizabeth
** Planned Production for Fruit Tree Crop Project Represent Island-Wide Targets
*** Planned Production for Reforestation Programme Represents Requests for Seedlings in Project Area

Table 11 Target Crops: Selection Criteria

Crop	Criteria Which Eliminate Crops				Selected Crops
	Crops which do not use Commercial Seedlings	Crops which have Existing Supply of Planting Material	Crops which have Limited Potential in Project Area	Crops which have Limited or Declining Markets	
Permanent Crops					
Banana					Banana *
Cocoa		Cocoa			
Coconut		Coconut			
Coffee		Coffee			
Grapefruit		Grapefruit			
Orange		Orange			
Ortanique		Ortanique			
Pimento		Pimento			
Plantain					Plantain *
Sugar Cane	Sugar Cane				
Other Crops	Other Crops				
Legumes	Legumes				
Vegetables					
Beetroot	Beetroot				
Cabbage					
Calaloo	Calaloo				
Carrot	Carrot				
Cauliflower					Cauliflower
Celery	Celery				

Crop	Criteria Which Eliminate Crops				Selected Crops
	Crops which do not use Commercial Seedlings	Crops which have Existing Supply of Planting Material	Crops which have Limited Potential in Project Area	Crops which have Limited or Declining Markets	
Cho-Cho	Cho-Cho				
Cucumber	Cucumber				
Egg Plant				Egg Plant	
Iceberg Lettuce					Iceberg Lettuce
Other Lettuce	Other Lettuce				Other Lettuce
Okra	Okra				
Pak Choi					Pak Choi
Pumpkin	Pumpkin				
String Bean	String Bean				
Tomato					Tomato
Turnip	Turnip				
Zucchini	Zucchini				
Yellow Squash	Yellow Squash				
Cantalope	Cantalope				
Broccoli					Broccoli
Musk Melon	Musk Melon				
Mustard				Mustard	
Condiments					
Escallion	Escallion				
Ginger	Ginger				
Onion	Onion				
Hot Pepper					Hot Pepper

Crop	Criteria Which Eliminate Crops				Selected Crops
	Crops which do not use Commercial Seedlings	Crops which have Existing Supply of Planting Material	Crops which have Limited Potential in Project Area	Crops which have Limited or Declining Markets	
Sweet Pepper					Sweet Pepper
Fruits					
Paw Paw	Paw Paw				
Pineapple	Pineapple				
Watermelon	Watermelon				
Other Fruits					Other Fruits
Cereals	Cereals				
Potatoes	Potatoes				
Yams					Yams
Other Tubers	Other Tubers				Other Tubers
Sorrel	Sorrel				
Fruit Tree Crops					Fruit Tree Crops
Ornamentals					Ornamentals
Timber & Forest					Timber & Forest

Table 11a Selection Criteria – Details of Crops which do not use Commercial Seedlings

Crops Which Do Not Use Commercial Seedlings	Reason
Sugar Cane	Vegetative Propagation
Other Crops	Direct Planting of Robust Seed Into Field/Grafting
Legumes	Direct Planting of Robust Seed Into Field
Beetroot	Very High Planting Density
Calaloo	Self-Propagation

Carrot	Very High Planting Density
Celery	Very High Planting Density
Cho-Cho	Direct Planting of Robust Seed Into Field
Cucumber	Direct Planting of Robust Seed Into Field
Other Lettuce	Very High Planting Density
Okra	Direct Planting of Robust Seed Into Field
Pumpkin	Direct Planting of Robust Seed Into Field
String Bean	Direct Planting of Robust Seed Into Field
Turnip	Very High Planting Density
Zucchini	Direct Planting of Robust Seed Into Field
Yellow Squash	Direct Planting of Robust Seed Into Field
Cantalope	Direct Planting of Robust Seed Into Field
Musk Melon	Direct Planting of Robust Seed Into Field
Escallion	Very High Planting Density
Onion	Very High Planting Density
Ginger	Vegetative Propagation
Paw Paw	Direct Planting of Robust Seed Into Field
Pineapple	Vegetative Propagation
Watermelon	Direct Planting of Robust Seed Into Field
Cereals	Direct Planting of Robust Seed Into Field
Potatoes	Vegetative Propagation
Other Tubers	Vegetative Propagation
Sorrel	Direct Planting of Robust Seed Into Field

Table 12 Estimated Total Demand – Selected Crops (2000)

Crop Detail	Local Crop Production (Tonnes)	Imports (Tonnes)	Total Demand (Tonnes)
Vegetables			
Cabbage	19,282	908	20,190
Cauliflower	1,308	95	1,403
Iceberg Lettuce	2,686	650	3,336
Pak Choi	4,639	N/A	4,639
Tomato	20,941	532	21,473
Broccoli *	1,206	217	1,423
Condiments			
Hot Pepper	4,438	2	4,440
Sweet Pepper	7,877	325	8,202
Plantains			
Horse Plantain	17,229	0	17,229
Other Plantain	5,103	0	5,103
Yams	147,709	0	147,709

* All-Island Estimates Based on Production in Project Area

Sources: Data Bank And Evaluation Division, MINAG
External Trade Statistics - 2000 (STATIN)

Table 12a Estimated Total Potential Production Crop Area - Selected Crops (2000)

Crop Detail	Area Reaped (Hectares)	Potential Expansion* (Hectares)	Total Potential Production Area (Hectares)
Vegetables			
Cabbage	1,152.0	54.2	1,206.2
Cauliflower	95.0	6.9	101.9
Iceberg Lettuce	193.0	46.7	239.7
Pak Choi	349.0	0.0	349.0
Tomato	1,193.0	30.3	1,223.3
Broccoli *	112.7	20.3	133.0
Condiments			
Hot Pepper	537.0	0.3	537.3
Sweet Pepper	643.0	26.6	669.6
Plantains			
Horse Plantain	1,022.0	0.0	1,022.0
Other Plantain	293.0	0.0	293.0
Yams	9,530.0	0.0	9,530.0

* All-Island Estimates Based on Production in Project Area

Sources: Data Bank And Evaluation Division, MINAG
External Trade Statistics - 2000 (STATIN)

Table 13 Crop Production and Area Reaped – Selected Crops (1991, 1999 and 2000)

Crop Detail	Production (Tonnes)					Area Reaped (Hectares)				
	1,991	1,999	2,000	% Change 1991-1999	% Change 1999-2000	1,991	1,999	2,000	% Change 1991-1999	% Change 1999-2000
Vegetables										
Cabbage	14,999	27,156	19,282	81.1%	-29.0%	1,185	1,467	1,152	23.8%	-21.5%
Cauliflower	399	1,128	1,308	182.7%	16.0%	49	93	95	89.8%	2.2%
Iceberg Lettuce	3,025	5,041	2,686	66.6%	-46.7%	241	339	193	40.7%	-43.1%
Pak Choi	3,009	4,929	4,639	63.8%	-5.9%	297	356	349	19.9%	-2.0%
Tomato	10,936	21,562	20,941	97.2%	-2.9%	1,057	1,208	1,193	14.3%	-1.2%
Broccoli *	N/A	N/A	1,206	N/A	N/A	N/A	N/A	113	N/A	N/A
Sub-Total: Vegetables	**32,368**	**59,816**	**50,062**	**84.8%**	**-16.3%**	**2,829**	**3,463**	**3,095**	**22.4%**	**-10.6%**
Condiments										
Hot Pepper	2,595	6,363	4,438	145.2%	-30.3%	541	730	537	34.9%	-26.4%
Sweet Pepper	2,551	8,546	7,877	235.0%	-7.8%	331	719	643	117.2%	-10.6%
Sub-Total: Condiments	**5,146**	**14,909**	**12,315**	**189.7%**	**-17.4%**	**872**	**1,449**	**1,180**	**66.2%**	**-18.6%**
Plantains										
Horse Plantain	21,223	21,032	17,229	-0.9%	-18.1%	1,608	1,259	1,022	-21.7%	-18.8%
Other Plantain	5,469	6,492	5,103	18.7%	-21.4%	359	365	293	1.7%	-19.7%
Sub-Total: Plantains	**26,692**	**27,524**	**22,332**	**3.1%**	**-18.9%**	**1,967**	**1,624**	**1,315**	**-17.4%**	**-19.0%**
Yams	186,104	195,688	147,709	5.1%	-24.5%	13,917	11,951	9,530	-14.1%	-20.3%

* All-Island Estimates Based on Production in Project Area

Table 14 Crop Conversion Tables

Crop	Seedlings * Per Hectare	Crop Rotations Per Year	Seedlings * Per Hectare Per Year
Cabbage	28,703	3	86,109
Cauliflower	35,879	3	107,637
Iceberg Lettuce	43,055	2	86,109
Pak Choi	28,703	4	114,813
Tomato	17,939	3	53,818
Broccoli	53,127	3	159,380
Condiments			
Hot Pepper	17,939	1	17,939
Sweet Pepper	35,879	2	71,758
Plantains			
Horse Plantain	1,705	1	1,705
Other Plantain	1,705	1	1,705
Bananas	1,705	1	1,705
Yams	2,990	1	2,990

* Includes Suckers (Plantain) And Setts/Seed Yams (Tubers)
Source: MINAG

Table 15 Competitive Analysis

Source	Crops	Assistance	Level of Competition
Montpelier Citrus Company	Citrus	Seedlings free from Citrus Tristeza Virus	Prohibitive
Ministry of Agriculture			
Fruit Tree Crop Project	Fruit Trees	Subsidized Seedlings	High
Domestic Food Crop Project	Vegetables, Condiments, Plantains & Tubers	Free Seeds/Seedlings& Planting Material	Moderate
Forestry Department	Timber & Forestry	Free Seedlings	High
Coffee Industry Board	Coffee	Subsidized Seedlings	Prohibitive
Coconut Industry Board	Coconut	Subsidized Seedlings	Prohibitive
Cocoa Industry Board	Cocoa	Subsidized Seedlings	Prohibitive

Table 16a Projected Seedling Market: Annual Acceptance Rates by Crop in GRW

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Vegetables										
Cabbage	0.20%	0.22%	0.24%	0.25%	0.26%	0.27%	0.28%	0.29%	0.30%	0.31%
Cauliflower	1.00%	1.10%	1.20%	1.25%	1.30%	1.35%	1.40%	1.45%	1.50%	1.55%
Iceberg Lettuce	1.00%	1.10%	1.20%	1.25%	1.30%	1.35%	1.40%	1.45%	1.50%	1.55%
Pak Choi	0.50%	0.55%	0.60%	0.63%	0.65%	0.68%	0.70%	0.73%	0.75%	0.78%
Tomato	0.20%	0.22%	0.24%	0.25%	0.26%	0.27%	0.28%	0.29%	0.30%	0.31%
Broccoli	1.50%	1.65%	1.80%	1.88%	1.95%	2.03%	2.10%	2.18%	2.25%	2.33%
Condiments										
Hot Pepper	5.00%	5.50%	6.00%	6.25%	6.50%	6.75%	7.00%	7.25%	7.50%	7.75%

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Sweet Pepper	0.50%	0.55%	0.60%	0.63%	0.65%	0.68%	0.70%	0.73%	0.75%	0.78%
Plantains										
Horse Plantain	1.00%	1.10%	1.20%	1.25%	1.30%	1.35%	1.40%	1.45%	1.50%	1.55%
Other Plantain	1.00%	1.10%	1.20%	1.25%	1.30%	1.35%	1.40%	1.45%	1.50%	1.55%
Bananas	0.15%	0.17%	0.18%	0.19%	0.20%	0.20%	0.21%	0.22%	0.23%	0.23%
Yams	1.00%	1.10%	1.20%	1.25%	1.30%	1.35%	1.40%	1.45%	1.50%	1.55%

Notes

Annual Acceptance Rate Represents Projected Percentage of Total Area Reaped by Crop which Purchases Seedlings from R2RW Plant Nursery

Table 16b Projected Seedling Market: Annual Acceptance Rated by Crop in Rest of Project Area

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Vegetables										
Cabbage	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
Cauliflower	0.10%	0.11%	0.12%	0.13%	0.13%	0.14%	0.14%	0.15%	0.15%	0.16%
Iceberg Lettuce	0.10%	0.11%	0.12%	0.13%	0.13%	0.14%	0.14%	0.15%	0.15%	0.16%
Pak Choi	0.05%	0.06%	0.06%	0.06%	0.07%	0.07%	0.07%	0.07%	0.08%	0.08%
Tomato	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
Broccoli	0.15%	0.17%	0.18%	0.19%	0.20%	0.20%	0.21%	0.22%	0.23%	0.23%
Condiments										
Hot Pepper	0.50%	0.55%	0.60%	0.63%	0.65%	0.68%	0.70%	0.73%	0.75%	0.78%
Sweet Pepper	0.05%	0.06%	0.06%	0.06%	0.07%	0.07%	0.07%	0.07%	0.08%	0.08%
Plantains										
Horse Plantain	0.10%	0.11%	0.12%	0.13%	0.13%	0.14%	0.14%	0.15%	0.15%	0.16%

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Other Plantain	0.10%	0.11%	0.12%	0.13%	0.13%	0.14%	0.14%	0.15%	0.15%	0.16%
Bananas	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Yams	0.10%	0.11%	0.12%	0.13%	0.13%	0.14%	0.14%	0.15%	0.15%	0.16%

Notes

Annual Acceptance Rate Represents Projected Percentage of Total Area Reaped by Crop which Purchases Seedlings from R2RW Plant Nursery

Table 17a R2RW Plant Nursery – Projected Market by Crop Area in GRW (Years 1 – 10)

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Vegetables										
Cabbage	0.27	0.30	0.33	0.34	0.36	0.37	0.38	0.40	0.41	0.42
Cauliflower *	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Iceberg Lettuce	0.08	0.09	0.10	0.10	0.11	0.11	0.11	0.12	0.12	0.13
Pak Choi	0.24	0.26	0.28	0.30	0.31	0.32	0.33	0.34	0.35	0.37
Tomato	0.29	0.32	0.35	0.36	0.37	0.39	0.40	0.42	0.43	0.45
Broccoli *	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Condiments										
Hot Pepper	3.60	3.95	4.31	4.49	4.67	4.85	5.03	5.21	5.39	5.57
Sweet Pepper	0.36	0.39	0.43	0.45	0.47	0.48	0.50	0.52	0.54	0.56
Plantains										
Horse Plantain	1.13	1.24	1.35	1.41	1.47	1.52	1.58	1.63	1.69	1.75
Other Plantain	0.51	0.56	0.61	0.64	0.66	0.69	0.72	0.74	0.77	0.79
Bananas	1.80	1.98	2.16	2.25	2.34	2.43	2.52	2.61	2.70	2.79

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Yams	10.55	11.60	12.66	13.18	13.71	14.24	14.77	15.29	15.82	16.35
Total	**18.85**	**20.74**	**22.62**	**23.57**	**24.51**	**25.45**	**26.39**	**27.34**	**28.28**	**29.22**

Unit: Hectares

* Area of Crop Reaped In GRW Increased by one (1) Additional Hectare for Cauliflower and Broccoli

Table 17b R2RW Plant Nursery – Projected Market by Crop Area in Rest of Project Area (Years 1 – 10)

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Vegetables										
Cabbage	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07
Cauliflower	0.08	0.08	0.09	0.10	0.10	0.10	0.11	0.11	0.11	0.12
Iceberg Lettuce	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Pak Choi	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03
Tomato	0.08	0.09	0.10	0.11	0.11	0.11	0.12	0.12	0.13	0.13
Broccoli	0.07	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.10	0.11
Condiments										
Hot Pepper	0.55	0.60	0.66	0.68	0.71	0.74	0.76	0.79	0.82	0.85
Sweet Pepper	0.09	0.10	0.11	0.12	0.12	0.13	0.13	0.14	0.14	0.14
Plantains										
Horse Plantain	0.10	0.11	0.12	0.12	0.12	0.13	0.13	0.14	0.14	0.15
Other Plantain	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Bananas	0.25	0.27	0.30	0.31	0.32	0.34	0.35	0.36	0.37	0.39
Yams	1.35	1.49	1.62	1.69	1.76	1.82	1.89	1.96	2.03	2.09
Total	**2.69**	**2.96**	**3.22**	**3.36**	**3.49**	**3.63**	**3.76**	**3.90**	**4.03**	**4.17**

Unit: Hectares

Table 17c R2RW Plant Nursery – Total Projected Market by Crop Area in Project Area (Years 1 – 10)

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Vegetables										
Cabbage	0.32	0.35	0.38	0.40	0.42	0.43	0.45	0.46	0.48	0.50
Cauliflower	0.09	0.10	0.11	0.12	0.12	0.12	0.13	0.13	0.14	0.14
Iceberg Lettuce	0.11	0.12	0.13	0.14	0.14	0.15	0.15	0.16	0.17	0.17
Pak Choi	0.25	0.28	0.31	0.32	0.33	0.34	0.36	0.37	0.38	0.39
Tomato	0.37	0.41	0.45	0.47	0.48	0.50	0.52	0.54	0.56	0.58
Broccoli	0.08	0.09	0.10	0.11	0.11	0.11	0.12	0.12	0.13	0.13
Condiments										
Hot Pepper	4.14	4.56	4.97	5.18	5.38	5.59	5.80	6.00	6.21	6.42
Sweet Pepper	0.45	0.50	0.54	0.56	0.59	0.61	0.63	0.66	0.68	0.70
Plantains										
Horse Plantain	1.22	1.35	1.47	1.53	1.59	1.65	1.71	1.77	1.83	1.90
Other Plantain	0.54	0.59	0.65	0.67	0.70	0.73	0.76	0.78	0.81	0.84
Bananas	2.05	2.26	2.46	2.56	2.67	2.77	2.87	2.97	3.08	3.18
Yams	11.90	13.09	14.28	14.87	15.47	16.06	16.66	17.25	17.85	18.44
Total	**21.54**	**23.69**	**25.85**	**26.92**	**28.00**	**29.08**	**30.16**	**31.23**	**32.31**	**33.39**

Unit: Hectares

Table 18 R2RW Plant Nursery – Projected Seedling Market by Crop (Years 1 – 10)

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Vegetables										
Cabbage	27,572	30,329	33,087	34,465	35,844	37,223	38,601	39,980	41,358	42,737
Cauliflower	9,903	10,893	11,883	12,378	12,873	13,368	13,864	14,359	14,854	15,349
Iceberg Lettuce	9,498	10,448	11,397	11,872	12,347	12,822	13,297	13,772	14,247	14,722
Pak Choi	29,254	32,180	35,105	36,568	38,031	39,493	40,956	42,419	43,881	45,344
Tomato	20,036	22,039	24,043	25,044	26,046	27,048	28,050	29,051	30,053	31,055
Broccoli	13,495	14,845	16,195	16,869	17,544	18,219	18,894	19,568	20,243	20,918
Condiments										
Hot Pepper	74,287	81,716	89,145	92,859	96,573	100,288	104,002	107,717	111,431	115,145
Sweet Pepper	32,417	35,658	38,900	40,521	42,142	43,762	45,383	47,004	48,625	50,246
Plantains										
Horse Plantain	2,085	2,294	2,502	2,607	2,711	2,815	2,920	3,024	3,128	3,232
Other Plantain	920	1,012	1,104	1,150	1,196	1,242	1,288	1,334	1,380	1,426
Bananas	3,498	3,848	4,198	4,373	4,548	4,722	4,897	5,072	5,247	5,422
Yams	35,575	39,132	42,689	44,468	46,247	48,026	49,804	51,583	53,362	55,141
Fruit Tree Crops	1,770	1,770	3,541	3,541	3,541	3,541	3,541	3,541	3,541	3,541
Ornamentals	936	936	936	936	936	936	936	936	936	936
Timber & Forest	8,398	8,398	8,398	8,398	8,398	8,398	8,398	8,398	8,398	8,398
Total	269,644	295,498	323,122	336,049	348,976	361,903	374,830	387,757	400,684	413,611

Unit: Seedlings/Suckers/Setts

Notes

1. Projected market for vegetables, condiments, plantain, bananas and yams based on projected crop area acceptance rates and requirements for seedlings/suckers/setts per hectare.

2. Projected market for fruit tree crop seedlings based on

   - New planting of fruit trees purchasing seedlings:

     5.7 Hectares per annum (years 1-2)
     11.3 Hectares per annum (years 3-10)

   - Seedling requirements for fruit tree crop seedlings:

     312 Per hectare
     936

3. Projected market for ornamental seedlings based on

   936 Seedlings per annum

4. Projected market for timber & forestry seedlings based on the following:

   - Requested planning area (see table 10a):

     839.8 Hectares

   - Acceptance rate for purchase of timber and forestry seedlings

     1.00% per annum

   - Seedling requirements for timber and forestry seedlings

     1,000 seedlings per hectare

FINANCIAL TABLES

Table 1 Capital Expenditure Schedule

Item	Total	Loan	Equity		%
			USAID	Other	
Land Clearing and Preparation (1)	1,277	0	1,277	0	1.28%
Nursery Construction (2)	43,293	0	43,293	0	43.27%
Irrigation System (3)	4,427	0	4,427	0	4.42%
Nursery Equipment (4)	13,680	0		13,680	13.67%
Perimeter Fencing (5)	17,547	0		17,547	17.54%
Internal Roadway (6)	5,106	0		5,106	5.10%
Marketing Start-Up Costs (7)	1,617	0	1,617	0	1.62%
Development Start-Up Costs (8)	1,064	0	1,064	0	1.06%
Contingency (9)	4,401	0	4,401	0	4.40%
Sub - Total	**92,411**	**0**	**56,078**	**36,333**	**92.36%**
Working Capital (10)	7,644	0		7,644	7.64%
Total Project Cost (Us$)	**100,055**	**0**	**56,078**	**43,977**	**100.00%**
Total Project Cost (J$)	**4,702,589**	**0**	**2,635,670**	**2,066,920**	
Gearing	100.00%	0.00%	56.05%	43.95%	

Notes

1. Land clearing and preparation for 1.0 hectare @ US$1,277 per hectare
2. Nursery construction (see financial table 1a)

3. Irrigation system based on supplier quotation
4. Nursery equipment (see financial table 1c)
5. Perimeter fencing based on 2 meter chain link fence with concrete base

    - Estimated @ 432 Running Meters @ US$39.34 Per Meter
    - Plus Gate @ Us$538
6. Internal roadway estimated @ 61 meters @ US$83.77 per meter of 20' hard surface
7. Marketing start-up costs include design and printing of brochure, sales calls and print advertising
8. Development start-up costs include provision for professional and legal fees and formation costs
9. Price and quantity contingency calculated @ 5% of project cost
10. Working capital projected @ one (1) month direct costs and overhead expenses
11. Foreign exchange rate: US$1.00 = J$47.00

Table 1a Nursery Construction - Details

Item	Units	Number	Cost Per Unit (US$)	Total (US$)
Shade House				
Sunstopper Shade Structure	SQ. M	1,003	14.81	14,857
73% Black Polypropylene Shade Fabric	SQ. M	1,003	3.01	3,024
Grommets	GROMMET	720	0.12	86
Black Cable Tie	BAG OF 100	15	10.70	161
Installation	MAN-DAYS	5	12.77	64
Sub-Total: Shade House				**18,191**
Screen House				
Insect-Proof Screen House	SQ. M.	201	50.83	10,200
Installation	MAN-DAYS	3	212.77	638
Sub-Total: Screen House				**10,838**
Potting Shed				
Construction Cost	SQ. M.	27	229.01	6,128

Item	Units	Number	Cost Per Unit (US$)	Total (US$)
Sub-Total: Potting Shed				**6,128**
Store Room				
Construction Cost	SQ. M.	13	480.93	6,434
Sub-Total: Store Room				**6,434**
Freight, Handling And Charges *				1,702
Total (Us$)				**43,293**
Total (J$)				**2,034,788**

* Freight, handling and charges on imported nursery items for 40 ft container Miami - Kingston

Table 1b Irrigation System - Details

Item	Units	Number	Cost Per Unit (US$)	Total (US$)
Irrigation Equipment	Hectares	0.81	4,049.74	3,278
Misting Propagator	Propagator	1	319.15	319
Guying Cable				64
Delivery				128
Installation	Man-Days	20	12.77	255
Supervision of Installation	Man-Days	3	127.66	383
Total (US$)				**4,427**
Total (J$)				**208,057**

Table 1c Nursery Materials and Equipment – Details

Item	Units	Number	Cost Per Unit (US$)	Total (US$)
Benches	16ftX4ft bench	18	35.09	632
Potting Shed Bench	3'X4'X10' bench	1	106.38	106
Potting Shed Stools	4' stool	4	39.15	157
Seedling Pots	6" plastic pot	5,000	0.13	630
Seedling Pots	4 3/4" plastic pot	5,000	0.15	742
Seedling Trays	72/98 cavity tray	735	0.69	503
Ground Cover Plastic	Sq. m.	8,094	0.76	6,123
Miscellaneous Small Tools & Equipment				1,000
Solar Water Heater	80 gal heater	1	1,787.23	1,787
Plantain & Banana Suckers	Sucker	1,000	2.00	2,000
Freight, Handling and Charges *				
Total (US$)				**13,680**
Total (J$)				**642,955**

* Freight, handling and charges on imported nursery equipment included in Financial Table 1a

Table 2 Foreign and Local Contest of Project Cost

Item	Total (US$)	Local (J$)	Foreign (US$)	% Foreign
Land Clearing & Preparation	1,277	60,000	0	0.00%
Nursery Construction	43,293	590,400	30,732	70.98%
Irrigation System	4,427	208,057	0	0.00%
Nursery Equipment	13,680	196,709	9,495	69.41%

Perimeter Fencing	17,547	824,691	0	0.00%
Internal Roadway	5,106	240,000	0	0.00%
Marketing Start-Up Costs	1,617	76,000	0	0.00%
Development Start-Up Costs	1,064	50,000	0	0.00%
Contingency (10%)	4,401	112,293	2,011	45.71%
Sub - Total	**92,411**	**2,358,150**	**42,238**	**45.71%**
Working Capital	7,644	359,274	0	0.00%
Total Project Cost (Us$ & J$)	**100,055**	**2,717,424**	**42,238**	**42.21%**
Total Project Cost (Us$)	**100,055**	**57,818**	**42,238**	**42.21%**
Total Project Cost (J$)	**4,702,589**	**2,717,424**	**1,985,165**	**42.21%**
Gearing	100.00%	57.79%	42.21%	

Table 3 Depreciation and Amortization Schedule

Item	Value ($)	Term (Years)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Land Clearing & Preparation	1,277	10	128	128	128	128	128	128	128	128	128	128
Nursery Construction	43,293	10	4,329	4,329	4,329	4,329	4,329	4,329	4,329	4,329	4,329	4,329
Irrigation System	4,427	10	443	443	443	443	443	443	443	443	443	443
Nursery Equipment *	10,308	10	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031
Perimeter Fencing	17,547	10	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755
Internal Roadway	5,106	10	511	511	511	511	511	511	511	511	511	511
Marketing Start-Up Costs	1,617	10	162	162	162	162	162	162	162	162	162	162
Development Start-Up Costs	1,064	10	106	106	106	106	106	106	106	106	106	106
Contingency (10%)	4,401	10	440	440	440	440	440	440	440	440	440	440

Item	Value ($)	Term (Years)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Total: US$	**89,039**		**8,904**	**8,904**	**8,904**	**8,904**	**8,904**	**8,904**	**8,904**	**8,904**	**8,904**	**8,904**
Total: J$	**4,184,831**		**418,483**	**418,483**	**418,483**	**418,483**	**418,483**	**418,483**	**418,483**	**418,483**	**418,483**	**418,483**

* Nursery equipment less seedling pots and plantain/banana suckers (see Financial Table 1c)

Table 4 Production Projections

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Number of Seedlings Produced										
Vegetables										
Cabbage	30,636	33,699	36,763	38,295	39,827	41,358	42,890	44,422	45,954	47,486
Cauliflower	11,003	12,103	13,203	13,754	14,304	14,854	15,404	15,954	16,504	17,054
Iceberg Lettuce	10,553	11,609	12,664	13,191	13,719	14,247	14,774	15,302	15,830	16,357
Pak Choi	32,505	35,755	39,006	40,631	42,256	43,881	45,507	47,132	48,757	50,382
Tomato	22,262	24,488	26,714	27,827	28,940	30,053	31,166	32,279	33,393	34,506
Broccoli	14,995	16,494	17,994	18,744	19,493	20,243	20,993	21,743	22,492	23,242
Condiments										
Hot Pepper	82,541	90,796	99,050	103,177	107,304	111,431	115,558	119,685	123,812	127,939
Sweet Pepper	36,018	39,620	43,222	45,023	46,824	48,625	50,426	52,227	54,028	55,829
Plantains	3,339	3,673	4,007	4,174	4,341	4,508	4,675	4,842	5,009	5,176
Bananas	3,887	4,275	4,664	4,859	5,053	5,247	5,442	5,636	5,830	6,025
Yams	35,575	39,132	42,689	44,468	46,247	48,026	49,804	51,583	53,362	55,141
Fruit Tree Crops	1,967	1,967	3,934	3,934	3,934	3,934	3,934	3,934	3,934	3,934
Ornamentals	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Timber & Forest	9,331	9,331	9,331	9,331	9,331	9,331	9,331	9,331	9,331	9,331
Total Number of Seedlings Per Annum	**295,651**	**323,983**	**354,281**	**368,447**	**382,613**	**396,778**	**410,944**	**425,110**	**439,275**	**453,441**

Unit: seedlings/suckers/setts
Mortality rate of seedlings/suckers: 10%

Table 4a Direct Cost Projections

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Potting Mix - Seedling Trays	2,163	2,380	2,596	2,704	2,812	2,921	3,029	3,137	3,245	3,353
Potting Mix - Seedling Bags	3,202	3,321	3,761	3,820	3,879	3,938	3,997	4,057	4,116	4,175
Seedling Bags	107	111	126	128	130	132	134	136	138	140
Soil	195	214	236	259	285	314	345	380	418	459
Sand	250	275	303	333	367	403	444	488	537	591
Manure	319	351	386	425	467	514	565	622	684	753
Fertilizer	19	21	23	26	28	31	34	38	42	46
Fungicide	115	126	139	152	168	184	203	223	245	270
Pesticide	115	126	139	153	168	185	203	224	246	270
Planting Material:										
Cabbage	73	80	88	91	95	99	102	106	110	113
Cauliflower	35	38	42	44	45	47	49	50	52	54
Iceberg Lettuce	3	3	3	3	3	3	4	4	4	4
Pak Choi	5	5	6	6	6	7	7	7	7	8

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tomato	1,279	1,407	1,535	1,599	1,663	1,726	1,790	1,854	1,918	1,982
Broccoli	9	10	11	12	12	13	13	14	14	14
Hot Pepper	1,239	1,362	1,486	1,548	1,610	1,672	1,734	1,796	1,858	1,920
Sweet Pepper	1,073	1,180	1,287	1,341	1,395	1,448	1,502	1,556	1,609	1,663
Plantain & Banana	0	0	0	0	0	0	0	0	0	0
Yams	5,150	5,665	6,180	6,437	6,695	6,952	7,210	7,467	7,725	7,982
Fruit Tree Crops	197	197	393	393	393	393	393	393	393	393
Ornamentals	104	104	104	104	104	104	104	104	104	104
Timber & Forest	47	47	47	47	47	47	47	47	47	47
Sub-Total: Planting Material	**9,212**	**10,099**	**11,182**	**11,625**	**12,068**	**12,511**	**12,955**	**13,398**	**13,841**	**14,284**
Total Direct Costs (Us$)	**15,698**	**17,025**	**18,891**	**19,626**	**20,373**	**21,134**	**21,910**	**22,702**	**23,512**	**24,341**
Total Direct Costs (J$)	**737,818**	**800,157**	**887,858**	**922,408**	**957,534**	**993,294**	**1,029,751**	**1,066,974**	**1,105,041**	**1,144,036**

Notes to Financial Table 4a

(US$)

- Potting mix - seedling trays @ 67.38 cu. cm. Per seedling @ $0.00013 per cu. Cm.
- Potting mix - seedling bags @ 1,226.23 cu. cm. Per seedling @ $0.00013 per cu. Cm.
- 6" seedling bags @ $0.0055 per bag
- Soil 10 cu. M. Per annum @ $19.48 per cu. m. With annual increase of 10%
- Sand 10 cu. M. Per annum @ $25.04 per cu. m. With annual increase of 10%
- Manure 10,000 kg per annum @ $0.03 per kg with annual increase of 10%
- Fertilizer (soluble mixture) @ 100 kg per annum @ $0.19 per kg with annual increase of 10%
- Fungicide @ 15 kg per annum @ $7.63 per kg with annual increase of 10%
- Pesticide @ 10 liters per annum @ $11.47 per liter with ann. Increase of 10%

Planting Material	Unit	Cost Per Unit (J$)	Seeds Per Unit	Cost Per Seed (J$)	Cost Per Seed (Us$)
Vegetables					
Cabbage	1/4 Lb Tin	2,800.00	25,000	0.1120	0.0024
Cauliflower	20gm Pack	892.37	6,000	0.1487	0.0032
Iceberg Lettuce	1 Lb Tin	930.21	82,500	0.0113	0.0002
Pak Choi	1/4 Lb Tin	211.45	29,600	0.0071	0.0002
Tomato	Pack	2,700.00	1,000	2.7000	0.0574
Broccoli	10gm Pack	289.22	9,900	0.0292	0.0006
Hot Pepper	1 Oz Seeds	640.00	908	0.7052	0.0150
Sweet Pepper	Pack	1,400.00	1,000	1.4000	0.0298
Plantain & Banana	Sucker	N/A			
Yams *	1 Kg Yam	40.00	5.9	6.8039	0.1448

Fruit Tree Crops US$ 0.1000 Average Cost Per Propagule (US$)
Ornamentals US$ 0.1000 Average Cost Per Propagule (US$)
Timber & Forest US$ 0.0050 Average Cost Per Seed (US$)
* Yam - Setts Per Unit And Cost Per Sett (J$) & (US$)

Table 4b Production Capacity Analysis

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Screen House										
Seedling Capacity - Seedling Trays	499,685	499,685	499,685	499,685	499,685	499,685	499,685	499,685	499,685	499,685
Shade House										
Seedling Capacity - Seedling Bags	24,967	24,967	24,967	24,967	24,967	24,967	24,967	24,967	24,967	24,967
Open Beds										
Seedling Capacity - Seedling Bags	220,543	220,543	220,543	220,543	220,543	220,543	220,543	220,543	220,543	220,543
Yam Mini-Setts	67,600	67,600	67,600	67,600	67,600	67,600	67,600	67,600	67,600	67,600
Total Production Capacity Per Annum	**812,795**	**812,795**	**812,795**	**812,795**	**812,795**	**812,795**	**812,795**	**812,795**	**812,795**	**812,795**

% Capacity Utilization	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Screen House										
Seedling Capacity - Seedling Trays	28.2%	31.0%	33.8%	35.2%	36.6%	38.0%	39.5%	40.9%	42.3%	43.7%
Shade House										
Seedling Capacity - Seedling Bags	33.1%	36.0%	38.9%	40.3%	41.8%	43.2%	44.7%	46.1%	47.6%	49.0%
Open Beds										
Seedling Capacity - Seedling Bags	50.3%	54.8%	60.3%	62.5%	64.8%	67.0%	69.3%	71.6%	73.8%	76.1%
Yam Mini-Setts	52.6%	57.9%	63.2%	65.8%	68.4%	71.0%	73.7%	76.3%	78.9%	81.6%
Total Production Capacity Per Annum	**36.4%**	**39.9%**	**43.6%**	**45.3%**	**47.1%**	**48.8%**	**50.6%**	**52.3%**	**54.0%**	**55.79%**

Notes To Financial Table 4b

Screen House

- Number of seedling trays 735
- Average number of seedlings per tray 85
- Average growing time per seedling 6 weeks
- Number of seedling rotations per year 8
- Crops grown in seedling trays include tomato, hot pepper & sweet pepper

Shade House

- Area Of Shade House 0.10 Hectares
- Number of seedlings per hectare 62,208 (with allowance of 20% for walkways)
- Average growing time per seedling 26 weeks
- Number of seedling rotations per year @ 4 average
- Crops grown in shade house include plantain & banana suckers, and ornamentals

Open Beds

- Area of open beds 0.71 hectares
- Number of seedlings per hectare 62,208 (with allowance of 20% for walkways)
- Average growing time per seedling 10 weeks
- Number of seedling rotations per year @ 5 average
- Crops grown in open beds include cabbage, cauliflower, iceberg lettuce, pak choi, broccoli, fruit tree crops, and timber and forestry

Yam Mini-Setts

- Targeted Production Capacity of Setts @ 1,300 Per Week

Average Growing Time Per Seedling	Seedlings	Time	Total
Vegetables	99,692	6	598,149
Fruit Tree Crops & Timber/Forestry	11,298	39	440,606
Total	110,989		1,038,755
Avg. Growing Time - Total			**9.36**

Table 5 Revenue Projections

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Selling Price Per Unit										
Vegetables										
Cabbage	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Cauliflower	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Iceberg Lettuce	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Pak Choi	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Tomato	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Broccoli	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Condiments										
Hot Pepper	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Sweet Pepper	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Plantains	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Bananas	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Yams	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Fruit Tree Crops	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Ornamentals	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Timber & Forest	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Number of Units Sold										
Vegetables										
Cabbage	27,572	30,329	33,087	34,465	35,844	37,223	38,601	39,980	41,358	42,737
Cauliflower	9,903	10,893	11,883	12,378	12,873	13,368	13,864	14,359	14,854	15,349
Iceberg Lettuce	9,498	10,448	11,397	11,872	12,347	12,822	13,297	13,772	14,247	14,722
Pak Choi	29,254	32,180	35,105	36,568	38,031	39,493	40,956	42,419	43,881	45,344
Tomato	20,036	22,039	24,043	25,044	26,046	27,048	28,050	29,051	30,053	31,055
Broccoli	13,495	14,845	16,195	16,869	17,544	18,219	18,894	19,568	20,243	20,918
Condiments										
Hot Pepper	74,287	81,716	89,145	92,859	96,573	100,288	104,002	107,717	111,431	115,145
Sweet Pepper	32,417	35,658	38,900	40,521	42,142	43,762	45,383	47,004	48,625	50,246
Plantains	3,005	3,306	3,606	3,757	3,907	4,057	4,208	4,358	4,508	4,658
Bananas	3,498	3,848	4,198	4,373	4,548	4,722	4,897	5,072	5,247	5,422
Yams	32,017	35,219	38,421	40,021	41,622	43,223	44,824	46,425	48,026	49,626
Fruit Tree Crops	1,770	1,770	3,541	3,541	3,541	3,541	3,541	3,541	3,541	3,541
Ornamentals	936	936	936	936	936	936	936	936	936	936
Timber & Forest	8,398	8,398	8,398	8,398	8,398	8,398	8,398	8,398	8,398	8,398
Total Number of Seedlings/Suckers Sold	**266,086**	**291,584**	**318,853**	**331,602**	**344,351**	**357,100**	**369,850**	**382,599**	**395,348**	**408,097**
Income										
Vegetables										

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cabbage	8,800	9,680	10,560	11,000	11,440	11,880	12,320	12,759	13,199	13,639
Cauliflower	3,160	3,476	3,792	3,950	4,109	4,267	4,425	4,583	4,741	4,899
Iceberg Lettuce	3,031	3,334	3,637	3,789	3,941	4,092	4,244	4,395	4,547	4,698
Pak Choi	9,336	10,270	11,204	11,671	12,137	12,604	13,071	13,538	14,005	14,472
Tomato	6,394	7,034	7,673	7,993	8,313	8,632	8,952	9,272	9,591	9,911
Broccoli	4,307	4,738	5,168	5,384	5,599	5,815	6,030	6,245	6,461	6,676
Condiments										
Hot Pepper	23,709	26,080	28,450	29,636	30,821	32,007	33,192	34,378	35,563	36,749
Sweet Pepper	10,346	11,380	12,415	12,932	13,449	13,967	14,484	15,001	15,519	16,036
Plantains	1,279	1,407	1,535	1,599	1,663	1,726	1,790	1,854	1,918	1,982
Bananas	1,489	1,637	1,786	1,861	1,935	2,010	2,084	2,158	2,233	2,307
Yams	10,218	11,240	12,262	12,773	13,284	13,795	14,306	14,816	15,327	15,838
Fruit Tree Crops	1,507	1,507	3,013	3,013	3,013	3,013	3,013	3,013	3,013	3,013
Ornamentals	597	597	597	597	597	597	597	597	597	597
Timber & Forest	2,680	2,680	2,680	2,680	2,680	2,680	2,680	2,680	2,680	2,680
Total Income: Us$	**86,853**	**95,060**	**104,774**	**108,877**	**112,981**	**117,084**	**121,188**	**125,291**	**129,395**	**133,498**
Total Income: J$	**4,082,109**	**4,467,835**	**4,924,373**	**5,117,236**	**5,310,099**	**5,502,961**	**5,695,824**	**5,888,687**	**6,081,549**	**6,274,412**

Notes To Financial Table 5

Unit: seedlings/suckers/setts
Mortality rate of seedlings/suckers/setts: 10%
Number of seedlings/suckers/setts sold = number of seedlings/suckers/setts produced less mortality rate

Table 6 Ten Year Income Statement Projections

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Income										
Vegetables	35,029	38,532	42,035	43,786	45,538	47,289	49,041	50,792	52,544	54,295
Condiments	34,054	37,460	40,865	42,568	44,271	45,973	47,676	49,379	51,082	52,784
Plantains & Bananas	2,767	3,044	3,321	3,459	3,598	3,736	3,874	4,013	4,151	4,290
Yams	10,218	11,240	12,262	12,773	13,284	13,795	14,306	14,816	15,327	15,838
Fruit Tree Crops	1,507	1,507	3,013	3,013	3,013	3,013	3,013	3,013	3,013	3,013
Ornamentals	597	597	597	597	597	597	597	597	597	597
Timber & Forest	2,680	2,680	2,680	2,680	2,680	2,680	2,680	2,680	2,680	2,680
Total Income: US$	**86,853**	**95,060**	**104,774**	**108,877**	**112,981**	**117,084**	**121,188**	**125,291**	**129,395**	**133,498**
Direct Costs										
Potting Mix - Seedling Trays	2,163	2,380	2,596	2,704	2,812	2,921	3,029	3,137	3,245	3,353
Potting Mix - Seedling Bags	3,202	3,321	3,761	3,820	3,879	3,938	3,997	4,057	4,116	4,175
Seedling Bags	107	111	126	128	130	132	134	136	138	140
Soil	195	214	236	259	285	314	345	380	418	459
Sand	250	275	303	333	367	403	444	488	537	591
Manure	319	351	386	425	467	514	565	622	684	753
Fertilizer	19	21	23	26	28	31	34	38	42	46
Fungicide	115	126	139	152	168	184	203	223	245	270
Pesticide	115	126	139	153	168	185	203	224	246	270
Planting Material	9,212	10,099	11,182	11,625	12,068	12,511	12,955	13,398	13,841	14,284
Total Direct Costs	**15,698**	**17,025**	**18,891**	**19,626**	**20,373**	**21,134**	**21,910**	**22,702**	**23,512**	**24,341**
Gross Operating Profit	71,155	78,036	85,883	89,252	92,608	95,950	99,278	102,590	105,883	109,157

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Overhead Costs										
Salaries And Wages	39,043	39,823	40,620	41,432	42,261	44,766	47,321	49,927	52,585	55,296
Statutory Deductions	3,514	3,584	3,656	3,729	3,803	4,029	4,259	4,493	4,733	4,977
Staff Costs	1,171	1,195	1,219	1,243	1,268	1,343	1,420	1,498	1,578	1,659
Electricity	1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787
Water	1,191	1,191	1,191	1,191	1,191	1,191	1,191	1,191	1,191	1,191
Telephone	1,021	1,021	1,021	1,021	1,021	1,021	1,021	1,021	1,021	1,021
Office Supplies	766	766	766	766	766	766	766	766	766	766
Traveling	2,043	2,043	2,043	2,043	2,043	2,043	2,043	2,043	2,043	2,043
Transport/Delivery Expense	4,596	4,596	4,596	4,596	4,596	4,596	4,596	4,596	4,596	4,596
Insurance	2,017	2,017	2,017	2,017	2,017	2,017	2,017	2,017	2,017	2,017
Depreciation	8,904	8,904	8,904	8,904	8,904	8,904	8,904	8,904	8,904	8,904
Accounting & Auditing	2,638	2,638	2,638	2,638	2,638	2,638	2,638	2,638	2,638	2,638
Marketing	4,255	4,255	4,255	4,255	4,255	4,255	4,255	4,255	4,255	4,255
Loan Interest	0	0	0	0	0	0	0	0	0	0
Land Lease	149	149	149	149	149	149	149	149	149	149
Contingency	2,937	2,937	2,937	2,937	2,937	2,937	2,937	2,937	2,937	2,937
Total Overhead Costs	**76,031**	**76,906**	**77,798**	**78,708**	**79,636**	**82,441**	**85,303**	**88,221**	**91,198**	**94,235**
Net Income Before Tax	**-4,876**	**1,130**	**8,085**	**10,544**	**12,972**	**13,509**	**13,975**	**14,368**	**14,685**	**14,922**
Company Tax	0	0	0	0	0	0	0	0	0	0
Net Income After Tax (US$)	-4,876	1,130	8,085	10,544	12,972	13,509	13,975	14,368	14,685	14,922

Crop Detail	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Accumulated Income After Tax (US$)	-4,876	-3,746	4,339	14,883	27,855	41,364	55,339	69,708	84,392	99,314
Net Income After Tax (J$)	-229,180	53,103	380,014	495,562	609,679	634,930	656,846	675,306	690,179	701,325
Accumulated Income After Tax (J$)	-229,180	-176,077	203,937	699,499	1,309,178	1,944,108	2,600,954	3,276,260	3,966,439	4,667,764

Notes To Financial Table 6

- Company tax @ 0.00% based on income tax exemption as agricultural enterprise
- Contingency on overhead costs @ 10.00% not including salaries and related costs
- Land lease @ $149 per hectare per annum for 1 hectare
- Water @ 3,721 cu. m. per annum @ US $0.32 per cu. m.
- Insurance @ annual premium of 3% of capital cost of construction, equipment and motor vehicle

Salaries and Wages	Number	Per Annum (J$)	Per Annum (US$)	Total (US$)
Nursery Manager *	1	250,000	5,319	5,319
Security Guards	2	192,500	4,096	8,191
Labourers:				
Nursery	5	150,000	3,191	15,957
Potting	3	90,000	1,915	5,745
Propagation Specialist	1	180,000	3,830	3,830
Total (Year 1)	**12**			**39,043**

* Nursery manager salary shared with MCC

- Annual increase in salaries and wages @ 2%
- Statutory deductions @ 9% of salaries and wages
- Staff costs @ 3% of salaries and wages
- Additional part-time staff costs from years 6-10 included @ 130 days per year @ US$ 12.77 per day

Table 7 Vertical Analysis of Income Statement Projections

Projections	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Income										
Vegetables	40.33%	40.53%	40.12%	40.22%	40.31%	40.39%	40.47%	40.54%	40.61%	40.67%
Condiments	39.21%	39.41%	39.00%	39.10%	39.18%	39.27%	39.34%	39.41%	39.48%	39.54%
Plantains & Bananas	3.19%	3.20%	3.17%	3.18%	3.18%	3.19%	3.20%	3.20%	3.21%	3.21%
Yams	11.76%	11.82%	11.70%	11.73%	11.76%	11.78%	11.80%	11.83%	11.85%	11.86%
Fruit Tree Crops	1.73%	1.58%	2.88%	2.77%	2.67%	2.57%	2.49%	2.41%	2.33%	2.26%
Ornamentals	0.69%	0.63%	0.57%	0.55%	0.53%	0.51%	0.49%	0.48%	0.46%	0.45%
Timber & Forest	3.09%	2.82%	2.56%	2.46%	2.37%	2.29%	2.21%	2.14%	2.07%	2.01%
Total Income: Us$	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Direct Costs										
Potting Mix - Seedling Trays	2.49%	2.50%	2.48%	2.48%	2.49%	2.49%	2.50%	2.50%	2.51%	2.51%
Potting Mix - Seedling Bags	3.69%	3.49%	3.59%	3.51%	3.43%	3.36%	3.30%	3.24%	3.18%	3.13%
Seedling Bags	0.12%	0.12%	0.12%	0.12%	0.12%	0.11%	0.11%	0.11%	0.11%	0.10%
Soil	0.22%	0.23%	0.22%	0.24%	0.25%	0.27%	0.28%	0.30%	0.32%	0.34%
Sand	0.29%	0.29%	0.29%	0.31%	0.32%	0.34%	0.37%	0.39%	0.41%	0.44%
Manure	0.37%	0.37%	0.37%	0.39%	0.41%	0.44%	0.47%	0.50%	0.53%	0.56%
Fertilizer	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
Fungicide	0.13%	0.13%	0.13%	0.14%	0.15%	0.16%	0.17%	0.18%	0.19%	0.20%
Pesticide	0.13%	0.13%	0.13%	0.14%	0.15%	0.16%	0.17%	0.18%	0.19%	0.20%
Planting Material	10.61%	10.62%	10.67%	10.68%	10.68%	10.69%	10.69%	10.69%	10.70%	10.70%
Total Direct Costs	18.07%	17.91%	18.03%	18.03%	18.03%	18.05%	18.08%	18.12%	18.17%	18.23%

Projections	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Gross Operating Profit	81.93%	82.09%	81.97%	81.97%	81.97%	81.95%	81.92%	81.88%	81.83%	81.77%
Overhead Costs										
Salaries And Wages	44.95%	41.89%	38.77%	38.05%	37.41%	38.23%	39.05%	39.85%	40.64%	41.42%
Statutory Deductions	4.05%	3.77%	3.49%	3.42%	3.37%	3.44%	3.51%	3.59%	3.66%	3.73%
Staff Costs	1.35%	1.26%	1.16%	1.14%	1.12%	1.15%	1.17%	1.20%	1.22%	1.24%
Electricity	2.06%	1.88%	1.71%	1.64%	1.58%	1.53%	1.47%	1.43%	1.38%	1.34%
Water	1.37%	1.25%	1.14%	1.09%	1.05%	1.02%	0.98%	0.95%	0.92%	0.89%
Telephone	1.18%	1.07%	0.97%	0.94%	0.90%	0.87%	0.84%	0.82%	0.79%	0.77%
Office Supplies	0.88%	0.81%	0.73%	0.70%	0.68%	0.65%	0.63%	0.61%	0.59%	0.57%
Traveling	2.35%	2.15%	1.95%	1.88%	1.81%	1.74%	1.69%	1.63%	1.58%	1.53%
Transport/Delivery Expense	5.29%	4.83%	4.39%	4.22%	4.07%	3.93%	3.79%	3.67%	3.55%	3.44%
Insurance	2.32%	2.12%	1.93%	1.85%	1.79%	1.72%	1.66%	1.61%	1.56%	1.51%
Depreciation	10.25%	9.37%	8.50%	8.18%	7.88%	7.60%	7.35%	7.11%	6.88%	6.67%
Accounting & Auditing	3.04%	2.78%	2.52%	2.42%	2.34%	2.25%	2.18%	2.11%	2.04%	1.98%
Marketing	4.90%	4.48%	4.06%	3.91%	3.77%	3.63%	3.51%	3.40%	3.29%	3.19%
Loan Interest	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Land Lease	0.17%	0.16%	0.14%	0.14%	0.13%	0.13%	0.12%	0.12%	0.12%	0.11%
Contingency	3.38%	3.09%	2.80%	2.70%	2.60%	2.51%	2.42%	2.34%	2.27%	2.20%
Total Overhead Costs	87.54%	80.90%	74.25%	72.29%	70.49%	70.41%	70.39%	70.41%	70.48%	70.59%
Net Income Before Tax	-5.61%	1.19%	7.72%	9.68%	11.48%	11.54%	11.53%	11.47%	11.35%	11.18%
Company Tax	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Projections	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Net Income After Tax (Us$)	-5.61%	1.19%	7.72%	9.68%	11.48%	11.54%	11.53%	11.47%	11.35%	11.18%
Accumulated Income After Tax (Us$)	-5.61%	-4.43%	3.29%	12.98%	24.46%	35.99%	47.53%	58.99%	70.34%	81.52%

Table 8 Ten Year Operating Cash Flow Projections

Projections	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Opening Balance	0	7,644	11,672	21,706	38,695	58,143	80,018	102,432	125,311	148,583	172,172
Cash Inflows											
Total Income		86,853	95,060	104,774	108,877	112,981	117,084	121,188	125,291	129,395	133,498
Loan	0										
Equity	100,055										
Total Inflows	**100,055**	**86,853**	**95,060**	**104,774**	**108,877**	**112,981**	**117,084**	**121,188**	**125,291**	**129,395**	**133,498**
Cash Outflows											
Capital Expenditure	92,411										
Direct Costs		15,698	17,025	18,891	19,626	20,373	21,134	21,910	22,702	23,512	24,341
Salaries And Wages		39,043	39,823	40,620	41,432	42,261	44,766	47,321	49,927	52,585	55,296
Statutory Deductions		3,514	3,584	3,656	3,729	3,803	4,029	4,259	4,493	4,733	4,977
Staff Costs		1,171	1,195	1,219	1,243	1,268	1,343	1,420	1,498	1,578	1,659
Electricity		1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787
Water		1,191	1,191	1,191	1,191	1,191	1,191	1,191	1,191	1,191	1,191
Telephone		1,021	1,021	1,021	1,021	1,021	1,021	1,021	1,021	1,021	1,021
Office Supplies		766	766	766	766	766	766	766	766	766	766
Traveling		2,043	2,043	2,043	2,043	2,043	2,043	2,043	2,043	2,043	2,043

Projections	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Transport/Delivery Expense		4,596	4,596	4,596	4,596	4,596	4,596	4,596	4,596	4,596	4,596
Insurance		2,017	2,017	2,017	2,017	2,017	2,017	2,017	2,017	2,017	2,017
Accounting & Auditing		2,638	2,638	2,638	2,638	2,638	2,638	2,638	2,638	2,638	2,638
Marketing		4,255	4,255	4,255	4,255	4,255	4,255	4,255	4,255	4,255	4,255
Loan Interest		0	0	0	0	0	0	0	0	0	0
Land Lease		149	149	149	149	149	149	149	149	149	149
Contingency		2,937	2,937	2,937	2,937	2,937	2,937	2,937	2,937	2,937	2,937
Company Tax		0	0	0	0	0	0	0	0	0	0
Loan Principal		0	0	0	0	0	0	0	0	0	0
Total Cash Outflows	**92,411**	**82,826**	**85,027**	**87,785**	**89,430**	**91,105**	**94,671**	**98,308**	**102,019**	**105,806**	**109,672**
Net Cash Position (US$)	7,644	4,028	10,034	16,989	19,448	21,876	22,413	22,879	23,272	23,589	23,826
Closing Balance (US$)	7,644	11,672	21,706	38,695	58,143	80,018	102,432	125,311	148,583	172,172	195,997
Net Cash Position (J$)	359,274	189,303	471,586	798,497	914,045	1,028,162	1,053,413	1,075,329	1,093,789	1,108,662	1,119,808
Closing Balance (J$)	**359,274**	**548,578**	**1,020,163**	**1,818,660**	**2,732,706**	**3,760,868**	**4,814,281**	**5,889,610**	**6,983,399**	**8,092,061**	**9,211,869**

Table 9 Ten Year Balance Sheet Projections

Projections	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Fixed Assets	89,039	89,039	80,135	71,231	62,327	53,423	44,519	35,616	26,712	17,808	8,904
Depreciation	0	8,904	8,904	8,904	8,904	8,904	8,904	8,904	8,904	8,904	8,904
Net Book Value	89,039	80,135	71,231	62,327	53,423	44,519	35,616	26,712	17,808	8,904	0
Current Assets											
Cash	7,644	11,672	21,706	38,695	58,143	80,018	102,432	125,311	148,583	172,172	195,997
Accounts Receivable	0	0	0	0	0	0	0	0	0	0	0

Projections	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Inventories	0	0	0	0	0	0	0	0	0	0	0
Total Current Assets	**7,644**	**11,672**	**21,706**	**38,695**	**58,143**	**80,018**	**102,432**	**125,311**	**148,583**	**172,172**	**195,997**
Current Liabilities											
Accounts Payable	0	0	0	0	0	0	0	0	0	0	0
Current Portion - Term Loan		0	0	0	0	0	0	0	0	0	0
Total Current Liabilities	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Net Current Assets	7,644	11,672	21,706	38,695	58,143	80,018	102,432	125,311	148,583	172,172	195,997
Term Loan	0	0	0	0	0	0	0	0	0	0	0
Net Worth (US$)	96,683	91,807	92,937	101,022	111,566	124,538	138,047	152,023	166,391	181,075	195,997
Net Worth (J$)	4,544,105	4,314,925	4,368,028	4,748,042	5,243,605	5,853,284	6,488,213	7,145,059	7,820,365	8,510,544	9,211,869
Financed By:											
Equity *	96,683	96,683	96,683	96,683	96,683	96,683	96,683	96,683	96,683	96,683	96,683
Accumulated Surplus		-4,876	-3,746	4,339	14,883	27,855	41,364	55,339	69,708	84,392	99,314
	96,683	91,807	92,937	101,022	111,566	124,538	138,047	152,023	166,391	181,075	195,997

* Equity Represents Total Project Cost Less Pre-Payments For Seedling Pots And Plantain/Banana Suckers (See Financial Table 1c)

Table 10 Ten Year Sources and Uses of Funds Projections

Projections	Year 1 - 2	Year 2 - 3	Year 3 - 4	Year 4 - 5	Year 5 - 6	Year 6 - 7	Year 7 - 8	Year 8 - 9	Year 9 - 10
Sources									
Net Income As Per Profit/(Loss) Account	1,130	8,085	10,544	12,972	13,509	13,975	14,368	14,685	14,922
Adjustment For Items Not Involving A Movement Of Funds									
Depreciation	8,904	8,904	8,904	8,904	8,904	8,904	8,904	8,904	8,904

Projections	Year 1 - 2	Year 2 - 3	Year 3 - 4	Year 4 - 5	Year 5 - 6	Year 6 - 7	Year 7 - 8	Year 8 - 9	Year 9 - 10
Net Income From Operations	10,034	16,989	19,448	21,876	22,413	22,879	23,272	23,589	23,826
Other Sources									
Increase In Loans									
Increase In Equity									
Sale Of Fixed Assets									
Total Sources (US$)	**10,034**	**16,989**	**19,448**	**21,876**	**22,413**	**22,879**	**23,272**	**23,589**	**23,826**
Total Sources (J$)	**471,586**	**798,497**	**914,045**	**1,028,162**	**1,053,413**	**1,075,329**	**1,093,789**	**1,108,662**	**1,119,808**
Applications									
Decrease In Loans									
Purchase Of Fixed Assets									
Increase/(Decrease) In Working Capital	10,034	16,989	19,448	21,876	22,413	22,879	23,272	23,589	23,826
Total Applications (US$)	**10,034**	**16,989**	**19,448**	**21,876**	**22,413**	**22,879**	**23,272**	**23,589**	**23,826**
Analysis Of Changes In Working Capital									
Current Assets									
Cash	10,034	16,989	19,448	21,876	22,413	22,879	23,272	23,589	23,826
Accounts Receivable	0	0	0	0	0	0	0	0	0
Inventories	0	0	0	0	0	0	0	0	0
Increase/(Decrease) In Current Assets	10,034	16,989	19,448	21,876	22,413	22,879	23,272	23,589	23,826
Current Liabilities									
Accounts Payable	0	0	0	0	0	0	0	0	0
Current Portion - Term Loan	0	0	0	0	0	0	0	0	0

Projections	Year 1 - 2	Year 2 - 3	Year 3 - 4	Year 4 - 5	Year 5 - 6	Year 6 - 7	Year 7 - 8	Year 8 - 9	Year 9 - 10
Increase/(Decrease) In Current Liabilities	0	0	0	0	0	0	0	0	0
Increase/(Decrease) In Working Capital	10,034	16,989	19,448	21,876	22,413	22,879	23,272	23,589	23,826

Table 11 Ratio Analysis

	US$	J$
Net Present Value =	2,974	139,756
Internal Rate Of Return =	12.71%	12.71%

Ratio	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Avg Yrs 1-10	* Formulas
Return On Equity	-5.04%	1.17%	8.36%	10.91%	13.42%	13.97%	14.45%	14.86%	15.19%	15.43%	10.27%	N.I./E.
Return On Investment	4.03%	10.03%	16.98%	19.44%	21.86%	22.40%	22.87%	23.26%	23.58%	23.81%	18.82%	N.C.F./P.C.
Return On Sales	-5.61%	1.19%	7.72%	9.68%	11.48%	11.54%	11.53%	11.47%	11.35%	11.18%	8.15%	N.I./S.
Return On Net Worth	-5.31%	1.22%	8.00%	9.45%	10.42%	9.79%	9.19%	8.64%	8.11%	7.61%	6.71%	N.I./N.W.
Return On Assets	-5.31%	1.22%	8.00%	9.45%	10.42%	9.79%	9.19%	8.64%	8.11%	7.61%	6.71%	N.I./T.A.
Interest Coverage Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	(L.I.+N.I.)/L.I.
Current Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	C.A./C.L.
Equity/Total Capital	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	N.W./T.C.
Asset Turnover	94.60%	102.28%	103.71%	97.59%	90.72%	84.81%	79.72%	75.30%	71.46%	68.11%	86.83%	S./T.A.
Debt/Equity	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	T.D./N.W.
Debt Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	T.D./T.A.

* S. = Sales
N.C.F. = Net Cash Flow
N.I. = Net Income
N.W. = Net Worth
T.A. = Total Assets
L.I. = Loan Interest
C.A. = Current Assets
C.L. = Current Liabilities
E. = Equity
P.C. = Project Cost
T.C. = Total Capital
T.D. = Total Debt

NPV and IRR Calculations	**YR 0**	**YR 1**	**YR 2**	**YR 3**	**YR 4**	**YR 5**	**YR 6**	**YR 7**	**YR 8**	**YR 9**	**YR 10**
Project Cost	-92,411										
Net Cash Flow		4,028	10,034	16,989	19,448	21,876	22,413	22,879	23,272	23,589	23,826
Loan Principal		0	0	0	0	0	0	0	0	0	0
Salvage Value											0
Total Benefits	**-92,411**	**4,028**	**10,034**	**16,989**	**19,448**	**21,876**	**22,413**	**22,879**	**23,272**	**23,589**	**23,826**
NPV	2,974										
IRR	12.71%										
Discount Rate	12.00%										

Table 12 Sensitivity Analysis

Sales	-30%	-20%	-10%	Constant	+10%	+20%	+30%
Toe + 30%	-590%	-486%	-383%	-280%	-177%	-73%	30%
Toe + 20%	-496%	-393%	-290%	-187%	-83%	20%	123%
Toe + 10%	-403%	-300%	-197%	-93%	10%	113%	217%
Constant	-310%	-207%	-103%	10,544	103%	207%	310%
Toe - 10%	-217%	-113%	-10%	93%	197%	300%	403%
Toe - 20%	-123%	-20%	83%	187%	290%	393%	496%
Toe - 30%	-30%	73%	177%	280%	383%	486%	590%

* "Toe": Total Operating Expenses (Before Tax) - Vertical
"Sales": Gross Sales - Horizontal

APPENDIX 1

LIST OF PERSONS INTERVIEWED

NAME	ORGANIZATION	POSITION
Mr. Michael Pryce	Data Base and Evaluation Division (DB&E) Ministry of Agriculture (MINAG)	Director
Mr. Raymond Ramdon	DB&E MINAG	Deputy Director
Ms. Claudette Bernard	Fruit Tree Crop Project MINAG	Director
Mr. Joe Suah	Fruit Tree Crop Project MINAG	Consultant
Mr.Joseph Johnson	Fruit Tree Crop Project MINAG	Plant Propagation Specialist
Mr. Errol Cameron	Domestic Food Crop Project MINAG	Project Coordinator
Ms. Margaret Mais	Domestic Food Crop Project MINAG	Marketing Coordinator
Ms. Valerie Roberts	Marketing and Credit Division MINAG	Director of Marketing
Mr. Everton Medley	Montpelier Research Station MINAG	Principal Research Director
Mr. Owen Gilpin	Montpelier Research Station MINAG	Crop Research Officer
Mr. Don McGlashan	MINAG	Director of Crops - Bodles
Mr. Len Hutchinson	MINAG/FAO Scotch Bonnet Project	Consultant
Mr. Peter Campbell	Lands Department MINAG	Parish Lands Officer – St. James
Mr. Hershell Brown	Agricultural Support Services Project MINAG	Project Director
Ms. Sadie Dixon	Rural Agricultural Development Authority (RADA)	Extension Officer – St. James
Mr. Venton Bucknor	RADA	Regional Marketing Officer
Ms. Janet Lawrence	Marketing Extension Unit RADA	Marketing Officer
Mr. Philip Chung	Crop Care Unit RADA	Senior Plant Protection Specialist
Ms. Marilyn Headley	Forestry Department	Conservator
Mr. Lawrence Nelson	Forestry Department	Senior Research Officer
Mr. Keith Porter	Forestry Department	Director of Technical Services
Ms. Donna Lowe	Forestry Department	Watershed Soil Conservation Officer
Mr. Norval Brown	Forestry Department	Regional Officer – St. James

NAME	ORGANIZATION	POSITION
Mr. Ian Gage	Environmental Foundation of Jamaica (EFJ)	Special Projects Manager
Ms. Marlene Lewis	EFJ	Membership and Community Relations Officer
Dr. Helen Asemota	Biotechnology Centre University of the West Indies (UWI)	Senior Lecturer
Dr. Andrew Wheatley	Biotechnology Centre , UWI	Research Fellow
Ms. Charlene Richards	Scientific Research Council (SRC)	Senior Scientific Officer
Mr. Aston Clarke	Coffee Industry Board	Regional Manager – Western Region
Ms. Edmondson	STATIN	
Ms. Eileen Chung	JEA Export Data/Pre-Clearance	Research Officer
Mr. Eric Allen-Pierce	Charles Gordon Market	Acting Assistant Manager
Ms. Whyaline Jarrett	Charles Gordon Market	Supervisor
Mr. Nicholas Jones	Montpelier Citrus Company (MCC)	Managing Director
Ms. Ann Lewis	MCC	General Manager
Mr. Basil Woodburn	Jamaica Agricultural Society (JAS)	Member – St. James Executive
Ms. Tracey Clarke	Social Development Commission (SDC)	Regional Manager
Ms. Ruth Reynolds	Registrar of Companies	Customer Service Supervisor
Mr. Clarence Franklyn	Vauxhall Farms and Plant Nursery	Managing Director
Mr. Glen Brooks	Fort George Botanicals Limited	Manager
Mr. Shalom Hodara	Jamaica Drip Irrigation Limited	Managing Director
Mr. Dudley Bennett	RADA/Mafoota Farmers Group	President
Ms. Grace Smith	RADA/Mafoota Farmers Group	Marketing Officer
Ms. Linette Wilks	JCDT/EU Plant Nursery – Brook Lodge	Community Conservation Officer
Mr. Andrew Morales	West Best Foods Limited	Managing Director
Ms. Murray	Gray's Pepper Products Limited	
Mr. Ian Allen	Sandals Montego Bay Hotel	Purchasing Manager
Mr. Lennisford Cornwall	Sandals Resorts International	Group Landscaper
Mr. Michael Andries	Half Moon Hotel	Purchasing Manager
Mr. Bertram Smith	Shoppers Fair Supermarket, Montego Bay	Assistant Store Manager
Ms. Hyacinth Chin-Sue	Pesticide Control Authority	Registrar of Pesticides (Former Nursery Operator – Mini-Sett Yam)
Mr. Byron McDonald	Development Bank of Jamaica (DBJ)	General Manager – Credit and Administration

NAME	ORGANIZATION	POSITION
Mr. Edgar Watson	Jamaica Agricultural Development Foundation (JADF)	General Manager – Investment and Finance
Ms. Golda Gayle	National Investment Bank of Jamaica (NIBJ)	Project Investment Officer
Mr. Dalkeith Hanna	Catadupa Property, St. James	Owner/Farmer

APPENDIX 2

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APPENDIX 3

JAMAICA – NON-TRADITIONAL FRESH PRODUCE EXPORTS (1999 – 2000)

Crop Group	Volume (Kgs)		Value (Us$)	
	2,000	**1,999**	**2,000**	**1,999**
Assorted Natural Products	467,651		647,417	824,813
Flowers & Foliage *	1,612,373		1,553,624	1,157,312
Fruits	11,761,674		9,218,230	11,226,248
Herbs & Condiments	307,862		1,681,158	1,742,992
Root Crops	9,924,113		14,504,944	15,643,942
Vegetables	2,218,841		2,324,734	2,291,107
Total	**24,680,141**	**31,218,696**	**29,930,107**	**32,886,414**

* Volume In Blooms/Pieces
Source: Jamaica Exporters Association (JEA)

APPENDIX 4

JAMAICA – USE OF HOT PEPPER AND ESCALLION BY AGRO-PROCESSORS (1995 – 1998)

Crop	Volume (Kgs)			
	1,998	**1,997**	**1,996**	**1,995**
Hot Pepper	642,517	562,622	456,881	322,880
Escallion	423,688	268,203	274,229	201,491
Total	**1,066,205**	**830,825**	**731,110**	**524,371**

Crop	Value (J$M)			
	1,998	**1,997**	**1,996**	**1,995**
Hot Pepper	23.0	17.7	14.9	8.2
Escallion	25.2	14.3	13.2	4.3
Total	**48.2**	**32.0**	**28.1**	**12.5**

Source: Marketing And Credit Division, MINAG

APPENDIX 5

JAMAICA – IMPORTS AND EXPORTS OF SELECTED CROPS (2000)

Crop Detail	Imports		Exports	
	Quantity (Kilos)	Value (J$)	Quantity (Kilos)	Value (J$)
Sweet Pepper	325,311	10,738,424	0	0
String Beans	52	3,405	23	872
Zucchini	28,142	1,076,380	0	0
Okra	555	52,840	736	25,965
Plantains	0	0	83	3,700
Tomatoes	532,117	17,188,939	0	0
Lettuce	650,284	19,018,922	0	0
Onions	9,260,139	88,788,457	0	0
Shallots	959	105,234	36,671	6,739,820
Cauliflower	94,664	3,552,134	0	0
Broccoli	216,664	8,866,329	273	13,763
Brussel Sprouts	1,020	117,215	0	0
Cabbage	907,824	11,505,762	0	0
Carrots	2,711,945	37,356,016	0	0
Turnips	1,932	90,572	0	0
Beets	6,553	164,575	511	77,901
Cucumber	2,173	137,916	64,770	2,939,678
Hot Pepper	2,294	253,229	260,201	26,903,017
Sweet Potato	673	17,614	1,070,092	63,097,164
Dasheen	0	0	743,352	33,890,497
Eddoes/Coco	0	0	341,634	17,261,172
Yams	0	0	8,182,368	503,859,029
Cantelopes	227,122	4,985,731	0	0
Melons	160,374	3,798,978	121,766	6,700,670
Papaya	0	0	2,036,446	125,800,348
Avocado	1,585	165,931	151,196	11,005,901
Mango	46	9,575	434,438	33,931,244
Soursop	0	0	19,881	1,197,774
Breadfruit	27	2,617	640,253	28,688,928

Crop Detail	Imports		Exports	
	Quantity (Kilos)	Value (J$)	Quantity (Kilos)	Value (J$)
Celery	67,214	2,102,171	0	0
Egg Plant	12,453	597,362	2,973	35,623
Ackee (Fresh)	0	0	2,099	474,989
Ackee (Processed)	0	0	1,075,031	220,700,979

Source: External Trade Statistics - 2000 (STATIN)

APPENDIX 5

LIST OF PROJECT MEETINGS

1. **Date: 2001 August 20**

   Attendees:

   - Dr. Mark Nolan – Chief of Party, R2RW Project
   - Dr. George Wilson – Watershed Management Specialist, R2RW Project
   - Mr. Richard Lumsden - Consultant

2. **Date: 2001 August 29**

   Attendees:

   - Great River Watershed Management Committee Task Force on Production and Marketing
   - Mr. Richard Lumsden - Consultant

3. **Date: 2001 September 11**

   Attendees:

   - Dr. George Wilson
   - Mr. Richard Lumsden

4. **Date: 2001 September 24**

   Attendees:

   - Dr. Mark Nolan
   - Dr. George Wilson
   - Mr. Richard Lumsden

R2Rw

Ridge to Reef Watershed Project