



St. Lucia

COUNTRY HIGHLIGHTS 2009

CARDI's contribution to agricultural research
and development, food production and
the reduction of poverty and hunger

Improving lives through agricultural research



Caribbean Agricultural Research and Development Institute

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agricultural research and development,
food production and the reduction of poverty and hunger**

CARDI OFFICE IN ST. LUCIA

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TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS	4
1.0 FOREWORD	5
2.0 REVIEW AND UPDATE OF AGRICULTURAL AND RURAL SECTORS	6
3.0 IMPLEMENTATION OF MEDIUM TERM PLAN, 2008/2010	8
4.0 STAFF MEMBERS	25
5.0 CONTACT INFORMATION.....	25

ACRONYMS AND ABBREVIATIONS

CARDI	Caribbean Agricultural Research and Development Institute
CS	Colour stage
CTA	Technical Centre for Agricultural and Rural Cooperation
CTV	Citrus Tristeza Virus
EBS	Erdogenous Brown Spot
MALFF	Ministry of Agriculture, Lands, Forestry and Fisheries
DTC	Demonstration and Training Centre
FAO	Food and Agricultural Organisation of the United Nations
IICA	Inter-American Institute for Cooperation on Agriculture
NCCARD	National Coordinating Committee for Agricultural Research and Development
PA	Protected Agriculture
SLMB	St. Lucia Marketing Board
WIR	West Indies Red (hot pepper variety)

1.0 FOREWORD

The Caribbean Agricultural Research and Development Institute (CARDI) St. Lucia Unit takes this opportunity to thank farmers, farmer organisations, the Ministry of Agriculture, Lands, Forestry and Fisheries (MALFF), affiliated agricultural institutions particularly the Inter-American Institute for Cooperation on Agriculture (IICA) and other stakeholders for their cooperation and

assistance during the execution and completion of its 2009 Annual Work Programme. The Unit would also like to thank its members of staff who have worked conscientiously (tirelessly) towards satisfactorily achieving the planned programme outputs.

Ronald Pilgrim
CARDI Country Representative

2.0 REVIEW AND UPDATE OF AGRICULTURAL AND RURAL SECTORS¹

The agricultural sector in 2009 continued to be a critical sector in the economy of Saint Lucia and although its contribution to GDP declined over the ten year period up to 2005, it continued to play a significant role in the country's socio-economic development. The sector plays a multi-functional role by generating foreign exchange and employment especially in the rural economy, and contributing towards economic growth and food security.

One of the areas central to providing confidence to the farming community is the identification of markets for commodities produced. It is with this in mind that the Saint Lucia Marketing Board (SLMB) was first established. It used to be a self-financing body, but Government has subsidized its operations over the last few years. This is not sustainable and Government has moved to establish a new marketing and distribution service for non-banana agriculture by year end. This has resulted in the formation of a committee made up of the Private Sector, the Hotel and Tourism Sector, WIBDECO, the Marketing Board and the Ministries of Finance, Economic Affairs and Agriculture. The committee's mandate is to advise on the best option for the new entity, set a timeline for the switchover and ensure that all mechanisms are in place for the transition.

After many years of discussion, Government on April 15, 2009, turned the sod for the commencement of construction on the long awaited meat processing facility at Beausejour. The goal of the project is to increase local livestock production, processing and marketing of meat in a viable and sustainable manner. It is expected that this facility will serve as a catalyst for the growth and development of the livestock sector and as a central marketing and processing facility. This "state of the art" Meat Processing Facility will create the marketing network to supply hotels, supermarkets and community-based distribution outlets, and lead to a reduction in the food import bill and increase employment within the sector. The Government of the Republic of China on Taiwan is providing funding for this facility at a total cost of approximately EC\$12.5 million. Government is also re-establishing the Beausejour Agricultural Station (BAS). The objective of this development initiative is to enhance the capacity of the BAS to service effectively the agricultural community with emphasis on the livestock sub-sector. This initiative will lead to improved quality in the breeding of stock, implementation of a national breeding programme and provision of training for farmers and other interest groups in livestock production. The initial cost of the project is estimated at EC\$3 million.

Attention is also being paid to the Anse La Raye Fisheries Project funded by the Government of Japan and scheduled to be completed in (Month) 2010. So far, a contract has been signed with Tokura Corporation of Japan to construct the US\$5.5 million facility, which includes a new Jetty, Locker Rooms for anglers and

Administrative Block to house the offices of the Fishermen's Cooperative, the Department of Fisheries Extension Office, Storage Facility and an Ice Making Facility.

Under the Special Framework of Assistance (SFA) programmes for 2001, 2002 and 2006, a number of initiatives were undertaken during the last financial year. These included the strengthening of quarantine and agricultural health services, completion of feeder roads (Phases 1 and 2), establishment of a port storage facility for fresh produce and flowers, establishment of a digital land resource information management system and development of alternative sources of income generation to remove the dependence on bananas.

During this financial year, Government will undertake a land tenure study, develop a strategic management plan for the Ministry of Agriculture, develop and implement a quality standards and certification system for major agricultural

products and construct two human resource development centres. In addition, the Government will embark on an agro-enterprise development project for which an audit will be conducted of agro-processors and artisans, in order to determine the packaging and small equipment needs of these industries. Government will then assist in meeting those needs. Government will also undertake a project aimed at encouraging the consumption of fresh domestic agricultural produce. This project is aimed primarily at changing the eating habits of Saint Lucians to attain a healthier lifestyle.

The linkage between the agricultural and tourism sectors will be strengthened and focus will be placed on such areas as agricultural zoning, land tenure and watershed management. The output from these activities will influence the development of strategies aimed at safeguarding the biodiversity, including forest and wildlife resources, all of which are critical to sustainable development.

¹ Source: Prime Minister's Budget Address, 2009

3.0 IMPLEMENTATION OF MEDIUM TERM PLAN, 2008/2010

3.1 Development of sustainable industries

3.1.1 Commodity development – crops

3.1.1.1 CARDI continues to support farmers with root crop planting material

The unavailability of planting material for the sustainable production of root crops (sweet potato, sweet cassava, tannia and yams) has resulted in reduced acreages and shortages for local consumption and exports. This situation has caused the price of planting material to increase, thereby increasing the cost of root crop production and in turn prices of the produce on the local market.

To increase and sustain the production of root crops for local consumption and export, root crop planting material multiplication plots were established at CARDI's Demonstration and Training Centre (DTC). These plots were 0.17 ha of sweet potato, 0.21 ha of sweet cassava, 0.17 ha of tannia and 0.32 ha of yam (Plates 1-5).



Plate 1: Sweet potato multiplication plot



Plate 2: Sweet cassava multiplication plot



Plate 3: Tannia multiplication plot at DTC



Plate 4: Yam multiplication plot at DTC

During the year, 196 kg of sweet potato slips (equivalent to 1.8 ha) and 4,000 sweet cassava sticks (equivalent to 0.8 ha), were distributed to 16 and 10 small farmers respectively. Tannia and yams will be harvested during the early part of 2010 for distribution to farmers. The multiplication and distribution of planting material to farmers is an on-going activity which will continue in 2010 in order to sustain root crop production in St. Lucia.



Plate 5: Farmer collecting sweet potato planting material at DTC

3.1.1.2 *Improving hot pepper production and marketing system*

Hot pepper production for export, offers great potential for penetrating the Miami market. Over the last 5 years, exports of hot peppers to the USA have shown an upward trend (27.4 tonnes in 2006 to 32.7 tonnes in 2008) and from all indications this is expected to continue for some time. The West Indies Red (WIR), Scotch Bonnet and CARDI Green are the major varieties grown in St Lucia. However, market reports from Miami indicate that peppers exported do not consistently meet the quality requirements of the market.

In order to increase and improve the quality of fruit exported, training in production and post-harvest handling of peppers was provided to 10 farmers (Plate 6), two extension officers, one exporter and three students from the Sir Arthur Lewis Community College. Field visits were made to 13 hot pepper farms so as to determine the major production constraints. The lack of irrigation, the high cost of fertiliser and the stagnant buying price (\$EC 2.20 / kg) which has not matched the increasing prices of inputs over the last decade, were identified as the most limiting factors for achieving optimum hot pepper production. It was concluded, that for pepper farmers to increase their productivity and improve quality, prices paid to farmers and exporters had to increase.



Plate 6: Hot pepper farmer being guided on selection of peppers for export

3.1.1.3 *Demonstrating improved passion fruit technology at CARDI's DTC*

A wide range of passion fruit production information has been produced by CARDI, Ministry of Agriculture, and other regional organisations. Such information needs to be refined, standardised, made more user friendly for farmers and aided by demonstration plots. An improved passion fruit production system demonstration plot (0.25 ha) was therefore established at the CARDI Demonstration and Training Centre (DTC). It involved the use of local material (posts and discarded telephone cable) in the construction of trellises for reducing cost of production and the application of a control pruning programme. Plants were spaced 2.4 m apart along the row and 2.4 m apart between the rows. This plot is also being used to generate the necessary information for upgrading a passion fruit production manual.

Twelve farmers and ten extension officers visited the passion fruit demonstration plot during 2009.



Plate 7: Farmers and Extension Officers observing improved passion fruit production system at CARDI's DTC

3.1.1.4 *Validating of improved passion fruit production system on farmers' fields*

Two validation trials were established on farmers' holdings (Plate 8). The trials consist of comparing two methods of passion fruit production: the improved production method vs. farmer's method. Each method was replicated three times per farm. In the improved production system cultural practices such as pruning, training of vines, timely application of fertiliser, pest and disease control were applied, as opposed to the farmer's system which did not apply such practices.



Plate 8: Establishing passion fruit validation trial on a farmer's holding

The validation trials were established in October 2009 with crop management and data collection in progress. This activity together with the demonstration plot will continue into 2010.

3.1.1.5 Preliminary investigation of Internal Browning of pineapple in storage

Supermarkets and hotels have complained about the quality of pineapple fruits purchased from farmers. The main problems identified are internal browning, also known as Endogenous Brown Spot (EBS) and the watery nature of the fruit, particularly when fruits are kept in storage at or below 12 – 13°C.

In St. Lucia, preliminary investigations were carried out with the most popular cultivated variety (Antigua Black), in order to determine the causes of EBS during storage. A completely randomised design using five treatments (CS1: all eyes green, no traces of yellow, CS2: 5 to 20% eyes yellow, CS3: 20 to 40% eyes yellow, CS4: 40 to 80% eyes yellow,

CS5: 90 to 100% eyes yellow) indicators of fruit maturity (Plate 9), was replicated three times. Fruits were stored at the recommended temperature (13 °C) used by hoteliers and super markets.

Fruits were removed from storage after 14 days and cut vertically. A subjective assessment (0 = present and 1 = absent) was used for determining the presence or absence of EBS.



Plate 9: Fruit maturity stages of Antigua Black

From left to right: Colour stage 1 (CS1) early stage of maturity, Colour stage 2 (CS2), Colour stage 3 (CS3), (Colour stage 4 (CS4) and Colour stage 5 (CS5) advance stage of maturity

The results as shown in Plate 10 indicated the presence of EBS at the early fruit maturity stage CS1. However EBS was absent (Plate 11) in fruits at the later maturity stages (CS2, CS3, CS4, and CS5) when stored at 13°C. The watery nature was only observed in fruit at the CS1 maturity stage. EBS is usually associated with exposure of pineapples to chilling temperatures (< 7°C), and is caused by the enzyme polyphenolic oxidase. Fruits at the early stage of maturity tend to be most susceptible to low storage temperatures. The watery nature

observed, only occurred in CS1 fruit and was due to the oozing of the cell contents as a result of EBS.



Plate 10: Internal Fruit Browning (EBS) in pineapple fruit CS1 stored at 13°C



Plate 11: Absence of EBS in mature pineapple, from left to right CS2, SC3, CS4 and CS5

3.1.1.6 Collection of local pineapple germplasm established at CARDI's DTC

Pineapples are produced by small scale farmers in St. Lucia mainly for local consumption. The main cultivars grown are the Smooth Cayenne and Antigua Black with some "unimproved" cultivars.

CARDI has conducted research in Dominica on two Taiwanese varieties TN #4 and TN #11 and small quantities were distributed to farmers. Recently small farmers' interest in pineapple production has grown and a Pineapple Association was formed to accommodate the increased number of farmers who recognised the crop as a sustainable revenue earner.

A germplasm plot (Plate 12) consisting of five locally grown varieties (Antigua Black, Smooth Cayenne, TN #4, TN #11 and a local Cayenne) was established and maintained at the DTC. The plot was also used to demonstrate to farmers the use of ground cover (polypropylene fabric) as a weed control measure.



Plate 12: Pineapple germplasm and demonstration plot at DTC

Seventeen farmers and two Extension Officers from the Ministry of Agriculture benefited by observing on-hand, the practices adopted for improving pineapple production.

3.1.1.7 *Determining the yield potential of locally grown pineapple varieties*

A few pineapple varieties exist which do not meet the quality requirement of selected markets such as the hotel industry. Therefore varieties were screened by growing them under local edaphic conditions. This will determine acceptable varieties and will allow farmers and marketers to better satisfy market demands and obtain better prices.

The trial shown below consist of a randomised block design with five treatments comprising of five cultivars (Antigua Black, Smooth Cayenne, Local Cayenne, TN #4 and TN #11) each replicated four times. Yield and quality characteristics data will be analysed to determine the best varieties suited for the local market. The characteristics to be tested are weight, brix, acidity and sugar/acid ratio.



Plate 13: Pineapple varietal trial at DTC

The trial is ongoing. Plants are not yet at the flowering stage. The results of the trial will be presented during 2010.

3.1.2 *Emerging Issues*

3.1.2.1 *Open Field vs. Undercover/Protected Agriculture (PA) for vegetable production*

Traditionally vegetables are grown by small farmers in Saint Lucia in the open field system during the first part of the year (January to May), which coincides with the dry season, and when the incidents of pest and disease are low. Some cultivation also takes place in the rainy season (June to December), but during this period vegetable production is severely affected by pests and diseases.

Though production of vegetables, using protective agriculture systems has been ongoing for the past 20 years, evaluation of these systems has not been a priority. CARDI is now validating PA systems in St. Lucia and the research is focusing on yields and cost of production studies of cucumber, sweet pepper and tomato produced under the Protected Agriculture and Open Field production systems, during both the dry and wet seasons.

In an attempt to realise its mandate of substantially reducing the importation of vegetables through appropriate technological interventions, the Ministry of Agriculture in collaboration with the Taiwanese Mission, is assisting farmers with the establishment of Protected Agriculture systems. These introductions are expected to help stabilise and sustain adequate levels of local vegetable production. The project costs EC\$1.5 million over 3 years. The Government of Taiwan will provide an initial EC\$250,000.00 to facilitate the first phase

of the initiative, which entails the installation of 26 (18 m x 9.3 m) PA systems.

Protected Agriculture technology as it is envisaged could help solve the problem of seasonal variation in vegetable supply. The project also takes into consideration a noticeable shift towards smaller farm size and the need to engage in more intensive forms of agriculture. PA systems could therefore be used to stabilise production levels especially during the rainy season.

The PA systems also provide opportunities to intensify production of certain types of vegetables and can target farmers with scarce land resources.

Table 1 shows that under the Protected Agriculture project 246 PA systems were distributed within the eight agricultural regions. Region 6 has the most PA systems and these are distributed among 20 male and seven female farmers, four schools and two other entities. Region four has the least number of PA systems and these are distributed to nine male and one female farmer.

Table 1: Distributions of “greenhouses” in Saint Lucia

Regions	LOCATION OF GREENHOUSES					Total no. of greenhouses	Total acreage covered by greenhouses
	Farms			Schools	Others		
	Male	Female	Total				
1	9	1	10	0	2	31	1.88
2	10	6	16	1	3	27	1.32
3	3	0	3	2	3	17	1.26
4	9	1	10	0	0	12	0.50
5	14	3	17	7	2	39	2.13
6	20	7	27	4	2	62	2.60
7	8	4	12	1	1	41	2.50
8	3	1	4	1	0	17	0.70
Total	76	23	99	16	13	246	12.89

Source: Ministry of Agriculture Statistics Unit 2007

* note that many locations have more than one greenhouse

Table 2, shows the value of imports for vegetables and fruits increased from EC\$ 33.2M in 2004 to EC\$ 46.0M in 2008 and Table 3 shows not much variation for

the estimated local production patterns for cucumber, sweet pepper and tomato between 2004 and 2008.

Table 2: Value of imports of vegetables and fruits to St Lucia, 2004-2008

Year	2004	2005	2006	2007	2008
Value (EC\$'000)	33,265	40,267	43,864	41,657	46,026

Source: Planning and Statistical, Ministry of Agriculture & the Foreign Trade Report 2009

Table 3: Estimated crop production and value for selected vegetables in St Lucia, 2004-2008

Crops	2004		2005		2006		2007		2008	
	Tonnes	Value EC\$	Tonnes	Value EC\$	Tonnes	Value EC\$	Tonnes	Value EC\$	Tonnes	Value EC\$
Cucumber	557	1,110	508	1,088	582	1,214	566	1,400	503	1,435
Sweet pepper	73	428	54	394	77	557	91	761	149	1,100
Tomato	218	1,479	192	1,395	307	1,886	328	2,204	346	2,177

Source: Planning and Statistical, Ministry of Agriculture & the Foreign Trade Report 2009

CARDI is comparing the growth and yield of selected crops under a Protected Agriculture System and an Open Field System. The **Protected Agriculture system** (Plate 14) comprises a plastic cover celloclim anti heat 200 mic (which has a life span of 5 years) covering a galvanise steel frame structure, measuring 18 m x 9.3 m (60 ft x 30 ft). The galvanise steel frames measuring 60 mm, has crop support, aluminium side clips and anchors. The PA system is equipped with 12, 16 mm round drip line 0.30 / 2L/h with a valve on each line. The drip irrigation system also consists of a pressure regulator 19 mm / disc filter with main valve 19 mm, and manifold PET 25 mm. Surrounding the bottom of the structure is an anti-bird netting also located to the front, back and sides of the structure.



Plate 14: Protected System structure, CARDI St. Lucia DTC

The **Open Field system** comprises an open area with the same dimension as that used for the Protected Agriculture system (18 m x 9.3 m). The land is covered with polypropylene fabric for controlling weeds. A drip irrigation

system was installed similar to that in the Protected Agriculture system (Plate 15). The area was first disc ploughed then rotavated. Dolomitic limestone was broadcasted at a rate of 500 kg/ha.



Plate 15: Layout of the Open Field System, CARDI St Lucia DTC

Cucumber (Tropic Cuke 11) was cultivated under both production systems (Plates 16 and 17) during the dry and wet seasons. A crop of sweet pepper (Plates 18 and 19) was also produced after the first crop of cucumber during the wet season. Seeds were sown and raised in seedling trays under nursery conditions and a starter solution (Miracle Grow) applied to the seedlings at a rate of 2 g/ L of water. A standard crop spacing of 60 cm x 60 cm was used at transplanting giving a total plant population of 270 plants per system (108 m²).

A trellis system was used for cucumber for the protected agriculture system. It consisted of a twine tied to the base of each plant and tied upright to horizontal crop support structures above the plants. Plants were trained to climb established trellises during their early growth phase.

In the open field system plants grew along the ground.

Pen manure (114 g) was applied to each planting hole. NPK fertilizer (12:16:24+2) and urea were applied alternatively at a rate of 114 g per plant every 21 days for the cucumber crop and applied monthly over 3 month period for the sweet pepper crop. On the first signs of appearance a regime for pests and diseases control was enacted using Manzate DF, Malathion 57 EC, New Mectin, Vericide and Bio Life at the manufacturer's recommended rates. Vericide was only applied to the cucumber crop in an attempt to control leaf spot diseases. The plots were irrigated daily for 30 minutes.

The cucumber crop was harvested twice a week over a 30-day period and the sweet pepper crop at weekly intervals over a 106-day period. Economic and environmental data were collected for both systems. Costs of production were calculated and comparisons made between both production systems for cucumber and sweet pepper.

The total rainfall recorded during the production period for the cucumber in the dry (March-May) and wet (November – December) seasons was 221 mm and 84.5 mm respectively (a very unusual pattern, as rainfall is usually much higher during the wet season). Total rainfall recorded during the production period for the sweet pepper during wet season (June-October) was 640.7 mm. Mean temperatures recorded under the Protected Agriculture system during the wet season and dry season varied between 28-30°C. In the Open Field system temperatures varied between 27-28 °C. The small difference in

temperature between the two systems may have implications for yield and incidence of pest and diseases. These factors will be investigated in a future study.



Plate 16: Cucumber grown under Protected Agriculture system



Plate 17: Cucumber grown in Open Field system



Plate 18: Sweet pepper grown under Protected Agriculture system



Plate 19: Sweet pepper grown in Open Field system

The results for the first crop of cucumber grown during the dry season indicated that the Protected Agriculture system was more efficient than the Open Field system. The Protected Agriculture system out yielded (640 kg) the Open Field system (307 kg). Table 4 gives the comparisons of cucumber yields, cost of production and net returns/ha for the two systems in the dry season.

Table: 4: Comparisons of cucumber yields, cost of production and net returns/ha for protected and open field systems in the dry season

Type of system	Yields (kg) /108 m ²		Cost of prod'n/kg of fruit (EC\$)	Net returns /ha (EC\$)
	Marketable (kg)	% Unmarketable		
Protected Agriculture	640	9.0	3.21	47,650
Open Field	307	24.5	3.57	12,087

During the wet season, the second crop of cucumber under the Protected Agriculture system out yielded (520 kg) the Open Field system (340 kg). Table 5 shows the comparisons of cucumber yields, cost of production and net returns/ha for protected and open field systems in the wet season. The crop under both systems of production was affected by a bacterial disease (Angular Leaf Spot) shown in Plate 20, with the Protected Agriculture system being more susceptible, hence the lower marketable

fruit production than during the dry season.

The marketable yield (520 kg) of fruit produced during the wet season for the Protected Agriculture system was 19% less than the 640 kg of marketable yield produced by the same system during the dry season. On the other hand, the Open Field system produced approximately 11% more marketable fruits during the wet season (340 kg) than during the dry season (307 kg).

Table: 5: Comparisons of cucumber yields, cost of production and net returns/ha for protected and open field systems in the wet season

Type of system	Yields (kg) /108 m ²		Cost of prod'n/kg of fruit (EC\$)	Net returns /ha (EC\$)
	Marketable	% Unmarketable		
Protected	520	1.8	3.66	17,520
Open Field	340	9.8	2.81	55,662



Plate 20: Bacterial Leaf infection of cucumber

cucumber crop grown during the wet season in both systems, but more so the Protected Agriculture system. Attempts were made with limited success to control the disease by pruning of infected leaves and spraying with a fungicide/bactericide (Vericide) at the rate of 9 cc /4.5 L.

A repeat of the cucumber trial will be conducted in 2010. This time a trellis system will be used in the Open Field system, thus ensuring a fairer comparison between the systems.

Sweet pepper – The first crop of sweet pepper was grown under both production systems during the wet season. Total rainfall recorded during the wet season (July to October) production period was 640.7 mm and the mean temperatures recorded under the Protected Agriculture and Open Field systems during the wet season were 28.0-30.0 °C and 27.0-30.0 °C respectively.

A high percentage of malformed/ undeveloped fruit was obtained in the Open Field system. This could be attributed to poor insect pollination, as insects may have less access to the flowers covered by the canopy on the ground, as opposed to Protected Agriculture system, where a trellis system was used, thereby allowing more flowers to be exposed to insect pollination.

The disparity between unit cost of production and net returns for the dry and wet season cucumber crops, was probably as a result of a bacterial disease, that seriously affected the second

The Protected Agriculture system yielded more (467 kg) than the open field system (158 kg). Table 6 gives comparisons of sweet pepper yields, cost of production and net returns/ha for protected and open field systems in the wet season. Data collection and analysis of the two production systems will continue in the dry season 2010 when a more detailed analysis will be made.

Table 6: Comparisons of sweet pepper yields, cost of production and net returns/ha for protected and open field systems in the wet season

Type of system	Yields (kg) /108 m ²		Cost of prod'n/kg of fruit (EC\$)	Net returns /ha (EC\$)
	Marketable	% Unmarketable		
Protected	467	8.6	3.62	173,300
Open Field	158	12.7	5.50	32,106

3.1.3 *Development of seeds and seedling banks*

3.1.3.1 *Revitalisation of the fresh water nut (coconut) industry*

Coconuts used as fresh water nuts are in great demand. Most fruits are harvested from the tall varieties traditionally used for copra production. These trees are no longer productive as they are very old and infested with the Red Palm Mite; they are also tall making it difficult to harvest nuts. As the demand for fresh water nuts increases there is need to increase production and sustainability of water nuts through the propagation and distribution of dwarf coconut seedlings to farmers.

Seven thousand Malayan dwarf coconut seed nuts (Green, Red and Yellow cultivars) from selected trees were propagated at the DTC and sold/distributed to farmers. Farmers will be monitored by MALFF to ensure that the seedlings are properly established and the farmers apply the recommended management practices.

A total of 1,036 seedlings were distributed to 20 farmers (equivalent to 13 hectares). Due to the adverse weather conditions in the last quarter of the year, the demand for seedlings was reduced. It is envisaged that the remaining seedlings will be distributed during the first quarter of 2010.

3.1.3.2 *Fruit and food crop germplasm maintenance*

Over the years there has been a loss of germplasm of various fruit and food crop species as new crop types are introduced. This has resulted in the loss of local crop species thereby reducing the island's crop biodiversity. CARDI over the years has continued to maintain tree crop species such as soursop, dwarf plantain, pomerac, breadfruit, dwarf coconut, red tannia, sweet cassava, mango, wax apple, dwarf golden apple, carambola, citrus, cashew, pomegranate at its DTC for future research.

The various orchards are also used to multiply germplasm for sale to farmers. Fruits are also sold to raise revenues.

Revenues of EC \$11,313 were earned from the sale of seedlings and fruit in 2009.

3.1.4 Support to invasive species initiatives

3.1.4.1 Red Palm Mite (*Raoiella indica*) investigations

Populations of Red Palm Mite, *Raoiella indica* Hirst (Acari: Tenuipalpidae), a leaf damaging pest of coconut have been reported in St Lucia since 2005. Research in controlling the pest was conducted by the MALFF in collaboration with CARDI between June 2007 and June 2009. This activity forms part of the regional effort aimed at controlling the pest in a number of Caribbean islands.

A field trial was conducted to examine the efficacy of four readily available chemicals (GC-Mite, Kumulus, Lime Sulphur and Safe Oil) on the control of the Red Palm Mite. The trial was carried out in five of the eight agricultural regions in St. Lucia. Seven trial areas (including CARDI's DTC Plate 21) were selected. At each trial site, each treatment was applied to a replicate plot of two trees. Each tree was labelled and GPS positioning was used to determine altitude, tree height, number of nuts and variety. Data were collected on the following parameters: live eggs, dead eggs, total eggs, live juveniles, dead juveniles, total juveniles, live adults, dead adults and total adults, live predators, dead predators and total predators.



Plate 21: Red Palm Mite trial plot at CARDI DTC

The results indicated that Safe Oil gave the best control for the first half of the experimental period and GC-Mite was the least effective. In the final 3 months of the trial, Kumulus and Lime Sulphur seemed to give the best control. Funding for the research ended in March 2009. However, efforts to obtain additional funding for the continuation of the research are ongoing. In the meantime, the search for predators with potential for reducing the mite populations on infested trees continues.

3.1.4.2 Maintenance of Citrus Tristeza Virus (CTV) tolerant varieties

Tristeza is a disease of citrus trees. It is usually transmitted by budding on susceptible sour orange rootstocks and also by the brown citrus aphids. Control of the disease on existing plantings is difficult. In new citrus plantings control of the disease can be achieved by the use of resistant / tolerant rootstocks. The MALFF has observed the presence of CTV on a few locations on the island.

CARDI continues to maintain at its DTC, the Volkameriana, Swingle citremelo and Carrizzo citrange CTV-tolerant rootstock (Plate 22). The propagation of CTV-tolerant citrus seedlings seems to be the only practical approach for curtailing the spread of the disease. CARDI produces seeds of the resistant / tolerant rootstocks for MALFF. The Ministry uses the seeds to propagate disease resistant / tolerant seedlings for distribution to farmers.



Plate 22: CTV tolerant lemon plot at DTC

3.2 Axis 2 – Development of strategic linkages

CARDI has been instrumental over the past 30 years in improving the quality of lives of the people of the Region through agricultural research and innovation. However it is important to ensure that CARDI's achievements are well known. This year, efforts were made through a number of initiatives to improve the public's knowledge of CARDI and its work. These initiatives included the following.

3.2.1 CARDI Open Day

The second Annual Open Day was held by the St. Lucia Unit on the 9th of December 2009 at the CARDI Demonstration and Training Centre (DTC) at La Ressource, Dennery. The theme for this year's Open Day was CARDI's slogan "Improving Lives through Agricultural Research" with emphasis on food security and rural livelihoods.

Over 60 persons attended the Open Day, participants included Senior Ministry of Agriculture personnel, IICA, Extension Officers, Marketers, Exporters, Farmers, Teachers and Agriculture Division of Sir Arthur Lewis Community College (Plates 23 and 24).



Plate 23: Minister of Agriculture Hon. Ezekiel Joseph delivering the feature address at the CARDI's Open Day Ceremony



Plate 24: Some of the attendees at CARDI Open Day

3.2.2 Exhibitions

The Unit participated in the National Exhibition to commemorate St. Lucia's 30th Anniversary of Independence (Plate 25). A booth displaying photographs of the Unit's activities over the last 30 years was showcased at the exhibition. An article highlighting the Unit's achievements over the years since independence was also published by the CARDI Unit in the Anniversary Magazine.



Plate 25: CARDI Booth at the National Exhibition

3.2.3 Training in post-harvest handling

Training was provided on request in post-harvest handling to the 20 Extension Officers of the MALFF (Plate 26) that participated in the Farmer Field School Training Programme organised by the Food and Agriculture Organisation (FAO) in collaboration with MALFF. The training was held at the CARDI DTC (Plate 26).



Plate 26: Extension Officers of MALFF attending post-harvest training lecture

3.2.4 National Coordinating Committee for Agricultural Research and Development (NCCARD)

The NCCARD met during October 2009 to decide on the Country Work Programme for 2010. The Work Programme was presented for approval at the CTA/CARDI Training Course in Research Methodology (Planning Development and Execution) held at the Hyatt Hotel, Trinidad & Tobago in November 2009. The final approval of the work programme will be given in early 2010.

3.3 Axis 3 – Institutional strengthening

3.3.1 Income generation

3.3.1.1 Production and sale of vegetables

CARDI in an effort to generate much needed revenue has produced selected vegetables (pumpkin, spinach amaranth, okra and bodi) for sale on the local market.

The vegetables were cultivated during the first 9 months of the year on 0.27 ha of land. Table 7 shows the yields, expenditure and revenues generated from

the production of selected crops. A net profit of \$3,702 was realised. Some of the produce was semi-processed (Plate 27) and sold to the SLMB and a selected restaurant.



Plate 27: Semi-processed okra and callaloo

Table 7: Yields, expenditure and revenue of produce grown at the CARDI DTC

Crop	Quantity (Kg)	Expenditure (EC\$)	Revenue (EC\$)
Bodi	234	454	1,488
Spinach	384	942	2,428
Okra	46.8	654	1,055
Pumpkin	626	570	940
Callaloo	153.5	400	811
TOTAL		3,020	6,722
Net Profit			3,072

4.0 STAFF MEMBERS

Professional staff

Ronald Pilgrim
Country Representative/
Post Harvest Specialist

Technical staff

Sylvester Frederick
Field Station Supervisor

Jacob Thomas
Field Assistant

Administrative staff

Sharon O'Brien
Administrative Assistant

5.0 CONTACT INFORMATION

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