



*Annual
Report*

2002

About the cover



1. *A CARDI Scientist demonstrates the use of a pheromone trap to a sweet potato farmer, Jamaica*
2. *Mature hot pepper berries in field containers, Barbados*
3. *One of several crossbreed sheep provided to rural farmers for enterprise development, Trinidad*

Caribbean Agricultural Research and Development Institute, 2003

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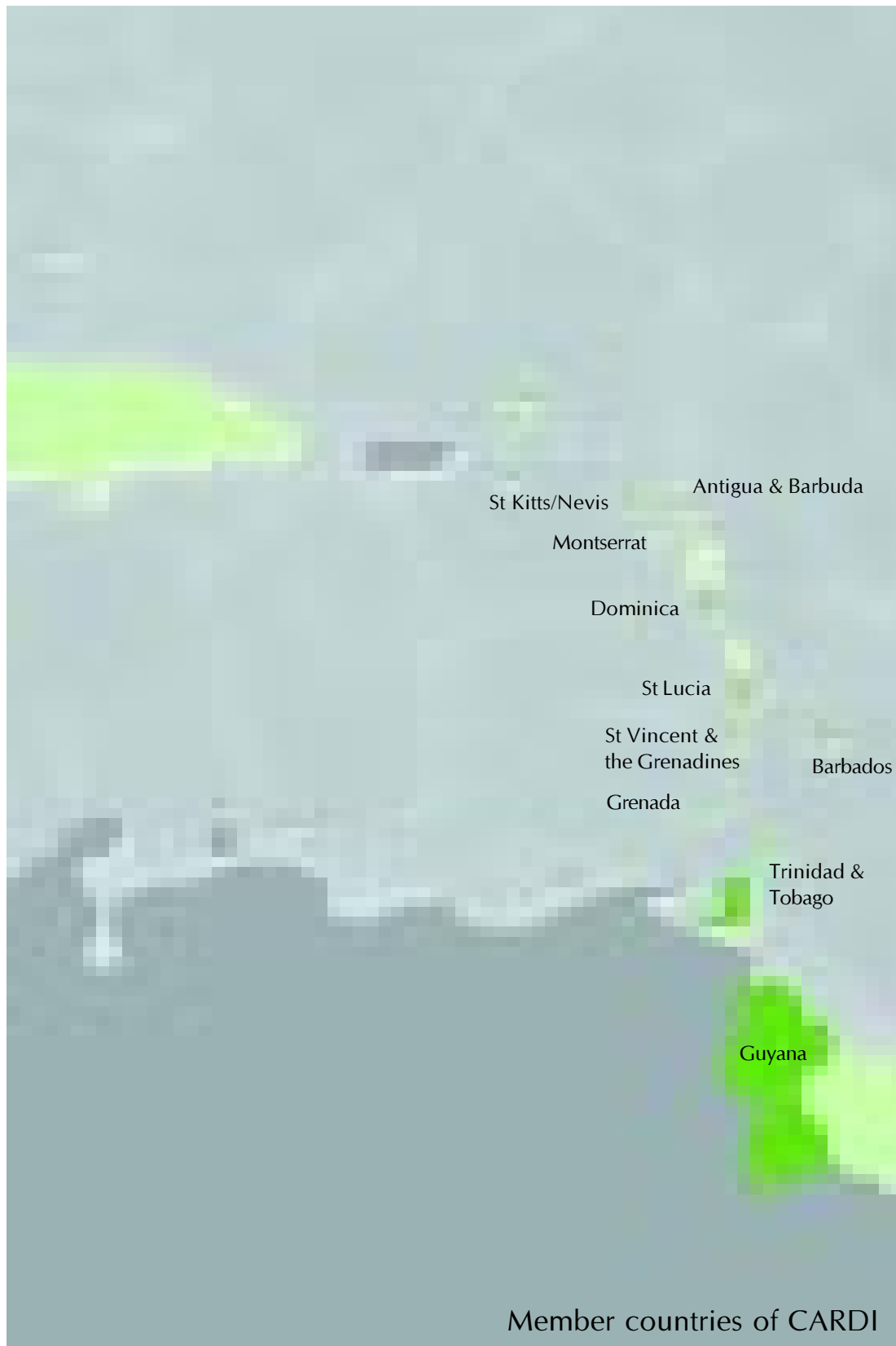
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Acronyms and Abbreviations

ACP	African, Caribbean and Pacific Group of States
CABA	Caribbean Agribusiness Association
CaFANN	Caribbean Farmers' and NGO Network
CAFP	Caribbean Agriculture Fisheries Programme
CAIS	Caribbean Agricultural Information Service
CAMID	Caribbean Agribusiness Marketing Intelligence and Development
CAPGERNET	Caribbean Plant Genetic Resources Network
CAPHNET	Caribbean Postharvest Technology Network
CARDI	Caribbean Agricultural Research and Development Institute
CARICOM	Caribbean Community
CARIFORUM	Caribbean Forum of African, Caribbean and Pacific (ACP) States
CARIFRUIT	Caribbean Fruit Network
CARINET	Caribbean Biosystematics Network
CARIVEG	Caribbean Vegetable Network
CAROT	Caribbean Roots and Tubers Network
CARTF	Caribbean Agricultural Research and Training Fund
CASRUNET	Caribbean Small Ruminant Network
CBB	Coffee Berry Borer
CEDAF	Centro para el Desarrollo Agropecuario y Forestal
CFCS	Caribbean Food Crops Society
CIB	Coffee Industry Board
CIMMYT	International Maize and Wheat Improvement Centre
CIPMNET	Caribbean Integrated Pest Management Network
CLAWRENET	Caribbean Land and Water Resources Network
CMS	Centre of Marine Sciences (Jamaica)
COTED	Council for Trade and Economic Development
CRIDNET	Caribbean Rice Industry Development Network
CRSP	Collaborative Research Support Programme
CRHPVT	Caribbean Regional Hot Pepper Varietal Trial
CTA	Technical Centre for Agricultural and Rural Cooperation
DEXIA	Dominica Export Import Agency
DFID	Department for International Development (United Kingdom)
DTC	Demonstration and Training Centre
EC	Eastern Caribbean
ETL	Economic Threshold Level
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FORAGRO	Regional Forum for Research in Agriculture
GECAFS	Global Environment Change and Food Systems
ICT	Information and Communications Technologies
IICA	Inter-American Institute for Cooperation on Agriculture
ILRI	International Livestock Research Institute
IPM	Integrated Pest Management
IT	Information Technology
LAN	Local Area Network
MALMR	Ministry of Agriculture Land and Marine Resources

Introduction

• Message from the Board of Directors

During 2002, the Caribbean Agricultural Research and Development Institute (CARDI) continued on a path of re-focusing its efforts to obtain the support of its main stakeholders while charting a new strategic approach in support of the thrust of the Regional Transformation Programme (RTP).

Recognising the need for reform, a report entitled: *A Definitive Proposal for the Future of CARDI: A New Dimension*, was prepared by the Small Multi-Disciplinary Independent Team chaired by Dr Carlos Aquino, former Director-General of the Inter-American Institute for Cooperation on Agriculture (IICA). It was presented to the 23rd meeting of the Conference of the Heads of Government of CARICOM for their consideration. The recommendations were developed as guidelines for the revitalisation of CARDI. The report also reiterated the importance of agricultural research in enabling the regional agricultural sector to respond actively, and in a timely manner, to the strategic challenges and dynamic opportunities characterising the agricultural and food sectors.

Another document entitled *Proposed Scenarios for CARDI Core Funding* was also prepared by the independent team under the guidance of the Board of Directors, which outlines the core budget required by a restructured CARDI, and presented to the Bureau of the Conference of Heads of the Caribbean Community at their 15th Meeting, held in Barbados in November 2002. The Bureau recommended that the three budget scenarios be submitted to the Conference of Heads of Government for a final determination on the matter.

In retrospect, the year 2002 was one in which there were continuing expectations of a more effective level of service. The Institute was guided through a critical period of restructuring by Dr Compton Paul, the Acting Executive Director, who demitted office in April 2002. His efforts contributed to the Institute's ability to stay on course while continuing to deliver research and development services to the region. In this regard we extend our gratitude to Dr Paul for his stewardship. We also extend congratulations to Bruce Lauckner, who has worked with CARDI since 1979 as a Biometrician, and who was appointed as the new Acting Executive Director.

The Institute continues to make valuable contributions to the agricultural sector, particularly through its research and development activities in member countries in spite of its constraints. Once consensus has been reached on the Report of the Small Multi-Disciplinary Team, the future of CARDI will be assured as it continues to make a positive impact on regional agriculture.

Dr Keith Archibald

Chairman, Board of Directors

Research for Development

- Country Summaries
- Country and Regional Programmes
 - Hot Pepper
 - Root Crops
 - Fruit Crops
 - Vegetables
- Traditional Crops
- Organic Crop Production
 - Small Ruminants
- Natural Resource Management

Country Summaries:

The following is a synopsis of the major work undertaken by CARDI and its national, regional and international partners during 2002. Much of the research and development activities undertaken was done in collaboration with Ministries of Agriculture, the University of the West Indies and the Inter - American Institute for Cooperation on Agriculture. These organisations are CARDI's major strategic partners in agricultural research and development in the region.

Antigua

The focal point for CARDI's hot pepper seed technology and production is Antigua. During the period 90 kg of seed (West Indies Red) was produced. Technical assistance was delivered to the Ministry of Agriculture in irrigation technology and breadfruit propagation.

Barbados

Research in Barbados centred on the genetic improvement of Caribbean hot pepper through breeding and selection. In this regard two promising hot pepper cultivars (CARDI Green and CARDI Red) were developed and selected to meet current market requirements. Additionally, Integrated Pest Management (IPM) research focused on the use of biological control strategies to mitigate the effects of the sugar cane moth borer. In 2002 moth borer infestation was kept below the economic threshold level of 5%.

Belize

Several soybean, peanut, cowpea and corn cultivars were evaluated for productivity in Belize, CARDI's centre for grain legume research and seed production. Data was collected on a number of promising lines, which will be released to farmers when evaluation is complete.

Dominica

In Dominica the focus has been on yam research, elucidating the factors associated with anthracnose and tuber hollowing. Results indicate that all the cultivars evaluated were equally susceptible to anthracnose and the incidence of hollowing was economically insignificant.

Grenada

CARDI worked to develop dwarfing systems for golden apple, the results of which are encouraging for the local juice and confectionery industry. Seedling production technologies for a wide range of vegetable crops were also developed by CARDI Agronomists in Grenada. The Institute provided vital technical support to the hot pepper industry by developing techniques to produce vigorous seedlings and by introducing new lines in keeping with changing market preferences.

Jamaica

Jamaica is the centre for goat production technologies and IPM in vegetables, food crops and coffee. Over 100 persons benefited from training in goat production technologies, and four farmers were direct beneficiaries of the goat commercialisation project. Additionally more than three hectares of improved forages were established.

Two IPM strategies that reduced the use of insecticides by 75–90% were developed to manage the major pests of callaloo, and biorationals were identified that provided significantly better protection against broad mites (on hot pepper) than conventional measures. Sixteen sweet potato varieties were evaluated and the majority was found to be tolerant to the sweet potato weevil, relative to the controls. The rearing and release of parasitoids continued to provide good control of the coffee berry borer. About 40,000 parasitoids were produced and results showed good efficacy in the field against the coffee berry borer.

Technical assistance was provided to several state agencies and a number of regional organisations. Project development resulted in the successful funding of a proposal to provide entomology services to the citrus replanting project of the Government of Jamaica.

Montserrat

Technical assistance was provided in the monitoring and control of the hibiscus and papaya mealy bugs. This activity extends to the provision of quarantine services at the ports of entry and serves to maintain the phytosanitary integrity of Montserrat. CARDI is also working to develop the cassava industry and in 2002 a study was undertaken to determine the market potential of the commodity. Based on CARDI's research, a cassava industry development programme was initiated in Montserrat.

St Kitts/Nevis

CARDI worked closely with the St Kitts Sugar Manufacturing Corporation, in its diversification and food security project, to increase the supply of yam planting materials to farmers. This was followed up with technical assistance to reduce tuber damage by soil insects, a major constraint to production. Pest and disease management is central to CARDI's work in St Kitts/Nevis, and in this regard technical assistance was provided in the management of papaya ring spot distortion virus, the papaya mealybug and the sweet potato weevil.

St Lucia

The main project executed in St Lucia was the Rural Enterprise project, which focused on land resource management for rural communities. Collaborative work between scientists from the Ministry of Agriculture and CARDI resulted in the establishment of training and demonstration plots and the transfer of irrigation technology to several communities. Training sessions were conducted for more than thirty farmers in a wide range of livestock and crop husbandry practices including rabbit production and management, internal parasite control in small ruminants and disease management in passion fruit. Rural farmers in some of the poorest communities in St Lucia were the primary beneficiaries of this project.



St Vincent and the Grenadines

Technical assistance was provided to the arrowroot project in germplasm collection. This germplasm is being evaluated for performance characteristics. Technical assistance was also provided to the Ministry of Agriculture in the critical areas of banana and hot pepper production systems.

Trinidad and Tobago

Detailed profiles of organic farms were developed and training in organic agriculture technology was delivered to more than forty farmers and technicians. A range of vegetable and food crops was evaluated for productivity under Tobago conditions and a number of cultivars of cabbage were identified as potential candidates for commercial production. Livestock research conducted in Tobago revealed that farmers, vendors and extension personnel could benefit from training in the treatment of helminthosis in small ruminants, as results suggest that prophylactic measures are required to prevent the development of parasite resistance in Tobago. A small ruminant industry analysis was undertaken resulting in two proposals being developed for the Ministry of Agriculture, Land and Marine Resources. The proposals outlined the case for self-sufficiency and the negotiating strategies for international trade in small ruminants, including legal protection measures for the local industry.

Country and Regional Programmes

Country Programmes

Antigua and Barbuda	<ul style="list-style-type: none"> • hot pepper seed technology development • hot pepper production and marketing systems development • production of planting material for the local agricultural sector • Betty's Hope Demonstration and Training Centre (DTC)
Barbados	<ul style="list-style-type: none"> • IPM services to the sugar industry of Barbados • hot pepper improvement for the Caribbean
Belize	<ul style="list-style-type: none"> • cereal and grain legume testing • soyabean production and marketing systems • vegetable and food crop testing • Belmopan Demonstration and Training Centre
Dominica	<ul style="list-style-type: none"> • validating cultural, post harvest and agro-processing technologies for improving the dasheem industry in Dominica • management strategy for yam anthracnose and hollowing in yam tubers • Julie mango forecasting • cassava production and marketing systems • hot pepper production and marketing systems • commercial pineapple production and marketing systems
Grenada	<ul style="list-style-type: none"> • production and marketing of fruits and vegetables for the local hospitality sector • golden apple agronomic studies • hot pepper production and marketing systems for local and export markets • Westerhall Demonstration and Training Centre
Jamaica	<ul style="list-style-type: none"> • IPM of vegetables and sweet potato • biological control of coffee berry borer • small ruminant breeding (Hounslow DTC) • feeding systems for small ruminants (Sam Motta DTC) • organic farming study (Mona DTC) • Walkers Wood sustainable agricultural practices project • review of soil management and farming practices
Montserrat	<ul style="list-style-type: none"> • cassava development project
St Kitts and Nevis	<ul style="list-style-type: none"> • production of yam planting material • IPM of fruits, vegetables and food crops • development of IPM services for the Leeward Islands • Taylor's Range Demonstration and Training Centre

Country and Regional Programmes

St Lucia

- St Lucia Rural Enterprise project
- La Resource Dennery Demonstration and Training Centre
- review of soil management and farming practices

St Vincent and the Grenadines

- banana production systems
- arrowroot production systems development
- hot pepper production and marketing systems
- sweet potato production systems development
- Rabacca Demonstration and Training Centre

Trinidad and Tobago

- organic crop production and marketing systems
- design and implementation of improved cropping systems for Tobago
- development of a viable small ruminant industry
- implementation of strategies for the development of the dairy industry
- Goldsborough Demonstration and Training Centre

Regional Networks and Programmes

PROCICARIBE Secretariat – general coordination, monitoring, evaluation
Caribbean Agribusiness Marketing Intelligence and Development Network
Caribbean Agricultural Information Service
Caribbean Biosystematics Network
Caribbean Fruit Network
Caribbean Integrated Pest Management Network
Caribbean Land and Water Resources Network
Caribbean Plant Genetic Resources Network
Caribbean Post Harvest Technology Network
Caribbean Rice Industry Development Network
Caribbean Small Ruminant Network
Caribbean Roots and Tubers Network
Caribbean Vegetable Network
Pink Mealy bug Regional Coordinating Unit

Hot Pepper

Hot pepper (*Capsicum chinense* Jacq.)

Scientists at CARDI started working with hot pepper as far back as the late 1980's. Research was directed towards the development of strategies to increase hot pepper production in the Eastern Caribbean to meet a growing export market demand for a Scotch Bonnet type pepper. Selections made in Antigua and Barbuda resulted in the release of a cultivar called West Indies Red with Scotch Bonnet in its parentage.

This early success was followed in 1997 by the establishment of a hot pepper breeding programme in Barbados, which focused on the creation and selection of new and superior genotypes. Additionally, the programme focused on breeding highly aromatic and pungent hot pepper cultivars to widen the advantage the Caribbean already enjoys on the hot pepper export markets.

By the end of 2002 the main results achieved could be summarised as follows:

- Extraction of three superior breeding lines that meet market requirements from the established cultivar, West Indies Red
- Purification and stabilization of 10 Caribbean hot pepper landraces
- Selection of 45 very promising recombinant inbred F₅ lines from the Scotch Bonnet (*Capsicum chinense* Jacq.) x Bird Pepper (*Capsicum frutescens* L.) cross

13 stable genotypes and 45 recombinant lines bred and selected for Caribbean farmers, processors and exporters

These stable genotypes and recombinant lines are ready for evaluation by farmers across the Caribbean and represent a significant increase in the number of hot pepper cultivars specifically bred and selected for Caribbean farmers, processors and exporters.

Two stable genotypes CARDI Red and CARDI Green were selected along with five purified landraces to go into the Caribbean Regional Hot Pepper Varietal Trial (CRHPVT) due to be carried out in 2003. The process of purification and stabilisation of Caribbean hot pepper landraces was advanced to the S₇ generation and those selected for inclusion in the regional varietal trial were Red Congo, Tiger Teeth, Touvin, Cayenne and Red Flat.

At the beginning of 2002 crosses between Scotch Bonnet (*C. chinense* Jacq.) and Bird Pepper (*C. frutescens* L.) produced 45 very promising individual lines that were selected based on criteria that included plants that were robust, prolific (more than 50 berries per picking), and having large berries with a thick fruit wall and high in aroma and pungency. The 45 accessions were isolated to produce pure F₅ seed.

Four of the accessions exhibited high levels of tolerance to the broad mite (*Polyphagotarsonemus latus* Banks) and will be further evaluated for use as commercial varieties and as parents in crosses to breed for resistance against broad mite.

At its seed technology center in Antigua, CARDI produced 90 kg of West Indies Red hot pepper seeds for distribution to farmers. Most of this seed was produced from berries grown by contract farmers under the supervision of CARDI scientists. This approach has proven to be the most cost-effective means of seed production. CARDI's Seed Technologist provided training to the farmers, ensured that isolation distances were maintained and monitored crop husbandry practices. This was part of the quality assurance procedures that were put in place to ensure that regional producers were provided with seed that showed maximum vigour and a germination rate in excess of 85%.

Yellow Scotch Bonnet is currently being produced in Belize by CARDI to satisfy the demand of local fresh fruit exporters. The Unit produced more than two kilograms of seed and achieved an extraction

rate in excess of two percent. In 2002, CARDI continued to invest in seed technology resources in Belize to increase the Unit's capacity to service the growing market demand for hot pepper. Seeds of West Indies Red are also in demand but this is largely satisfied by the centre in Antigua.

In **Dominica** CARDI conducted agronomic research on West Indies Red to determine yield and cost characteristics. This is part of the continuous assessment CARDI is doing with this cultivar to determine its performance in all ecological zones in the Caribbean. It was discovered that plants produced more berries during August and October, approximately 10 to 12 months after transplanting. This information will be useful for farmers in Dominica who are targeting markets in North America during the winter. Studies showed that cost of production ranged from EC\$0.57 to EC\$1.25 per kg of fruit. Crop care accounted for 63% of total input costs, while land preparation contributed to 43% of total labour costs. CARDI is working on mechanisms to reduce production costs, so that farmers can derive more benefit from their crops.

In **Jamaica** the problem of the broad mite, which is a serious pest to the hot pepper industry in the Caribbean, has been the subject of considerable research. The approach has been to use Integrated Pest Management (IPM) strategies. Now in the ninth year the focus was to confirm that increased broad mite incidence on hot pepper was due to excessive pesticide use and to test biorational pesticides to control broad mite with minimal effects on its predators. The population of broad mites per hot pepper plant was about 10-fold higher in samples from fields with high insecticide usage compared with those from fields with little or no pesticide usage (75.5 vs. 7.3 mites per plant). Significantly higher broad mite populations occurred during the wet season (67%) than during the dry season (29%). Abametectin, diafenthurion and hexathiazox provided the best combination of maximum suppressive effects on broad mite populations and least on its predators, making these chemicals suitable for use in an IPM programme for broad mite on hot pepper.

Machinery put in place for farmers to meet the USA's quarantine requirements with respect to pests of hot peppers exported from Jamaica

Monitoring and surveillance of the gall midge (*Contarinia lycopersci*) is now viewed as the critical component in a strategy that addresses the USA's quarantine requirements for hot peppers exported from Jamaica. Survey mechanisms and web-based databases have been established for effective detection and intervention.

Table 1 Interception of pests on hot pepper submitted for export from Jamaica to the USA between January 1998 and December 2001.

Year	Number of interceptions			
	Gall midge	Mealybug	Other	Total
1998	104	97	37	238
1999	6	7	4	17
2000	1	2	0	3
2001	9	1	1	11

Following the visit of a USDA delegation in late 2001, the USDA's position on mandatory fumigation of all hot pepper from Jamaica was revisited and criteria for conditional fumigation were outlined. A multi-agency task force has put in place machinery, which includes the compilation of a handbook, which will assist farmers in meeting these requirements. A database of approximately 400 farmers has been established and a traceability coding system implemented to allow trace-back of produce intercepted with the presence of actionable pests.

Technical assistance was given to the export programme in **St Vincent and the Grenadines** by way of a study to generate cost of production data from the demonstration plot at Rabacca Field Station. Harvesting of the crop began in late September and data is currently being collected and processed.

A trial consisting of two replicates of eight varieties (Arledge Heirloom, Carmine, Charleston Hot, Devil's Tongue, Fatalatic, Firenza Hybrid, Habanero Golden and Serrano) brought in from New Jersey, USA was established in October 2001 in Grenada. The objective of the trial was to evaluate performance under local conditions. Bearing began in the dry season of 2002 and yield was seriously affected by the dry weather. None of the varieties tested was suitable for the export market. The variety Habanero Golden had a suitable fruit shape (lantern type) and size (3.24 cm length; 3.28 cm diameter), however, it was severely affected by a virus infection and could not be recommended for production.

Root Crops

Sweet potato (*Ipomoea batatas*)

Sweet potato weevils, (*Cylas formicarius*), sweet potato leaf beetles (*Typophorus viridicyaneus* sp.) and the wireworm - *Diabrotica systema* (WDS) soil insect complex significantly reduce sweet potato production in Jamaica and the rest of the Caribbean. In response, CARDI has widened its Integrated Pest Management (IPM) approach to include growing resistant cultivars, using cultural practices and environmentally friendly insecticides such as botanicals and biorationals. This is aimed at assisting sweet potato farmers to produce a high quality, internationally competitive commodity.

In 2001–2002, a total of 16 sweet potato accessions were evaluated in Jamaica. Most of them (including local entries) were found to be more tolerant to damage by sweet potato weevils than the susceptible checks 'Beauregard' and SC 1149-19. Yields ranged between 1.09 to 10.96 kg/plot (plot of 25 plants, 30 cm apart on a bed one metre wide) and 18 to 32 roots/plot. One entry, PI 531116, from the breeding programme of the International Institute for Tropical Agriculture in Nigeria, was found to be the most resistant to damage by sweet potato weevils. The highest mean weight of tubers was obtained from TIS 30–30, PI531116 and Picadito. The entries 94-127, PI

5231116, White Regal, Sidges, Tinian and TIS 30–30 showed resistance to sweet potato leaf beetle larvae.

In February 2002, Extension Officers from the Ministry of Agriculture, participated in a one-day workshop and field day in the identification of the major pests of sweet potato. Strategies used in the IPM programme were outlined and participants were trained in making pheromone traps.



Yvonne Grindley, Zonal Plant Protection Specialist, RADA (sixth left) demonstrates how to make the sweet potato weevil pheromone traps from recycled plastic containers.

A modification of Talekar's trap proves effective in capturing significant numbers of sweet potato weevils

Of the 10 types of pheromone traps evaluated for monitoring sweet potato weevils, a modification of Talekar's trap was the most effective. Traps constructed from 5-gallon milk pails or jugs also captured significant numbers of weevils.

In St Kitts it was discovered that local lines performed better than many of the recently introduced lines. Under the dry exposed field conditions in which the plants were grown, survival of the local lines was better and they were more tolerant to stem and root damage by sweet potato weevils. In one of the three trials carried out in 2002 results indicated that the highest yields came from Picadito and Never Miss. The lowest yield came from Cabey, a widely grown local cultivar, which on this occasion was very profuse in vegetative growth. Cabey and Picadito were unaffected by the weevil.

However, with the exception of *Cabey*, all cultivars were adversely affected (at least 20%) by damage due to tunneling by the white grub (*Phyllophaga* spp.). Fifty-nine percent of the yield of *Picadito* was lost to grub tunneling.

Work was started in Tobago on the establishment of a germplasm bank. The cultivars in the bank are being evaluated for yield potential and resistance to the sweet potato borer (*Megastes grandalis*). Early results indicate that two cultivars (White man and Red skin) are highly susceptible to borer damage.

Dasheen (*Colocasia esculenta*)

In CARICOM, Dominica, Jamaica and St Vincent and the Grenadines are the main producers of dasheen for both local consumption and export of the fresh commodity. Over the past 15 years researchers in the Dominica Unit have carried out studies to address the majority of the production, post harvest and handling problems which have constrained dasheen exports. As a result, dasheen exports have increased and stabilized over the past ten years in Dominica as shown in Table 2.

Table 2 Production, export volumes and revenues earned from the export of dasheen between 1990 and 2000 in Dominica.

Year	Production (t)	Exports (t)	Value EC\$000
1990	1,808	NA	NA
1991	12,106	766	1,247
1992	9,774	620	1,028
1993	11,395	738	1,233
1994	11,878	849	1,066
1995	11,858	758	1,442
1996	11,862	665	1,492
1997	12,020	681	1,719
1998	11,903	788	2,208
1999	12,068	787	2,285
2000	NA	752	1,970

Current research is focused on providing producers in Dominica with information to facilitate more accurate yield prediction. In this regard, the effects of three fertiliser formulations under low and high rainfall areas and their interactions on three dasheen

cultivars (common, white and pink petioles) were studied. The results have provided more accurate information on fertiliser requirements of the three main exportable cultivars when grown in low and high rainfall areas. Additionally, the results allowed correlations to be made between growth characteristics and yield so that yield projections could be made during the early growth stages (Table 3)

Table 3 Percentage of common dasheen corms that satisfied export weight specification (0.91–1.85 kg) from the various treatment combinations, Dominica

Season	Location	Treatment combinations		
		S1D3	S2D3	S3D3
Wet	Grand Bay	6.6	7.0	0.0
Wet	Wet area	12.6	29.7	12.7
Dry	Grand Bay	0.0	0.0	0.0
Dry	Wet area	17.1	32.5	26.4

Where:

S1, S2 and S3 represent a spacing of 55x55, 65x65 and 75x75 cm respectively

D1, D2 and D3 represent a planting depth of 20, 25 and 30 cm respectively

Currently, exporters are using a fungicidal dip treatment (Ridomil MZ 72) as a control measure for healthy undamaged corms. This fungicide is banned and not recommended for use as a post harvest treatment for dasheen exported to the United States (US) and the European Union (EU). CARDI has therefore been working to address the concerns of consumers in importing countries regarding pesticide residues on food crops. Balancing human health issues with the sanitary and phytosanitary requirements of the export trade prompted a study on the use of calcium hypochlorite as an alternative post harvest dip. However, the results showed that calcium hypochlorite was not effective in controlling dasheen corm rot. More work is being undertaken to find a safe alternative, so that Dominican farmers can continue to meet the ever-increasing stringent import requirements of developed countries.

In another trial investigating the effects of low temperature ($10\text{ }^{\circ}\text{C} \pm 1$) storage on dasheen corm rot at different time intervals (12, 18, 24, 30 and 36 hours) from harvest to storage, no significant treatment differences were observed. Corms that were removed from cool storage after 15 days and placed under ambient temperature conditions became affected by corm rot over a period of 5 days. It will be necessary to conduct experiments using sodium hypochlorite and examine the effects of the early application of the cool chain on undamaged, clean, untreated dasheen at the farm level, through to refrigerated coolers/containers.

Yam (*Dioscorea* spp.)

The export of some of the most commercially viable yam cultivars from **Dominica** and other countries in the Eastern Caribbean has been reduced and in some instances curtailed because of the incidence of the anthracnose-causing fungus *Collectotrichum gloeosporioides*. This fungus is thought to be made up of different physiological races which are cultivar specific. Studies were carried out in **Dominica** to determine the existence and distribution of physiological races of *C. gloeosporioides* and validate which of these races were pathogenic to the various cultivars in use.

Cultivars were placed into three groupings based on the level of anthracnose damage observed on their leaves. Ladies Yam (*Dioscorea rotundata*) and Yellow Yam (*D. rotundata cayenensis*) were the least affected, while St Croix (*D. alata*) and Ador (*D. bulbifera*) were the most severely affected. The isolates of *C. gloeosporioides* could also be placed into three main races based on their levels of pathogenicity. Isolates from Ladies Yam (*D. rotundata*) and Babawoule (*D. alata*) were the most virulent. Overall, it was shown that all isolates from the cultivars infect all species. This research will deepen our understanding of the anthracnose complex and allow scientists at CARDI to develop appropriate strategies for its management.

Another problem being tackled in **Dominica** relates to the incidence of hollowing in yam tubers as reported by farmers that grow the commodity. In order to determine the factors that cause hollowing of tubers, a study was conducted examining the interactions of cultivar, the use of head,

middle and tail setts and fertiliser on the extent of hollowing of tubers. Results showed that the incidence of hollowing was economically insignificant.

In **St Kitts/Nevis** CARDI provided technical support in pest management to yam growers and in collaboration with **St Kitts Manufacturing Corporation** produced in excess of 3,200 kg of planting material for distribution to farmers.

Cassava (*Manihot esculenta*)

CARDI is collaborating with an agro-processing enterprise in **Dominica** to support the processing of cassava into snack chips. Scientists are conducting an assessment of eight local cultivars to determine their suitability for processing. The parameters of the cultivars that are important from the point of processing are shown in Table 4. Bois Blanc had the highest mean number of storage roots and the highest mean fresh tuber weight per plant. There were no rotted storage roots for any of the varieties.

Table 4 Mean yield of selected parameters of eight indigenous cassava cultivars, **Dominica**

Cultivar	Storage root		Mean fresh	
	length*	diameter**	No/plant	wt/plant kg
Beward	3	5	5.1	1.72
Cent Livre DelG	5	3	6.0	1.87
Te Coco	5	3	6.3	1.53
Cent Livre NLOE	5	5	4.8	1.61
Bois Blanc	5	5	8.5	2.41
Bois Bleu	5	5	5.9	1.96
Zekake	5	5	6.8	1.78
Sept Fey	5	5	4.8	1.54

Key:

*Storage root length (mm)

3 = short: < 180

5 = medium: 180–305

7 = long: > 305

**Storage root diameter (mm)

3 = narrow: < 40

5 = medium: 40–100

7 = long: >100

In **Montserrat**, CARDI is working to establish and multiply cassava germplasm. The technique used has been very successful and the material is being further multiplied for distribution to farmers. This work will provide the basis for the development of the local cassava bread industry, for which CARDI is providing technical support.

A trial to evaluate yield potential was established in **Tobago** with two Trinidad varieties (MX 59 and MX 60). These are preferred by Tobago vendors, to varieties from the UWI Field Station, Trinidad (M Col 22 and Maracas Black Stick) and three local varieties (Picni Muma, White Butter Stick and Yellow Butter Stick). Results will be available early in 2003 when the plots are due to be harvested.

Cereals and Grain Legumes

In **Belize** CARDI is actively collaborating with the Ministry of Agriculture, Fisheries and Cooperatives, Non-governmental Organisations, private industries and farmers to increase the availability of quality seed crops of cereals and legumes. Extensive research is currently being done on oilseed crops, especially soybean, in support of Belize's aim of achieving domestic self-sufficiency in protein concentrate for animal feed, and oils and fats for human consumption.

Soybean (*Glycine max* (L.) Merrill)

The 2002 soybean research activities concentrated on the continued screening and evaluation of cultivars/lines with the principal objective of identifying for commercial production, those that perform as well as, or better than CARDI-15, CARDI S-89, Padre and D-082-2740. These are the cultivars which are currently recommended for commercial production. Cultivars/lines were first screened in un-replicated preliminary evaluation trials and those that appeared promising were identified for inclusion in subsequent variety evaluation trials.

Of the 87 entries in the preliminary evaluation trial planted in December 2001, 38 performed better than the control CARDI-15. In the varietal evaluation trial planted in November 2001, 12 cultivars/lines were compared with CARDI-15 as the control. At least six of the entries performed just as well as the control.

CARDI's research and development efforts have taken advantage of advances in the improvement of soybean production to increase local production and improve yields and grain quality. Based on adaptability evaluations over a number of years and seasons, it has been possible to make recommendation of varieties suitable for the two main planting seasons. (See Table 5).

Table 5 Soybean varieties recommended for planting during the the two main seasons

June/July	October/November
CARDI S-15 ^c	CARDI S-15
CARDI S-89	CARDI S-89
CB-1088	D-082-2740
D-082-2740	Vernal
Vernal	Padre
Padre	

^c Control Variety

Under a contract with the Ministry of Agriculture, Fisheries and Cooperatives, CARDI provided technical assistance and support to the Soybean Project by developing appropriate production and processing systems. Two large-scale on-farm demonstration trials were established at New Hope and Blue Creek in the Orange Walk District using various soybean varieties and examining their performance under four different fertiliser regimes. (See Table 6).

At both locations, CARDI S-15 produced the highest yields (2,535 and 3,125 kg/ha, at 14% moisture content, respectively). While there was a significant response to higher rates of potassium fertiliser at New Hope, this was not the case at Blue Creek where the soil type is different. Ongoing research work in soybean resulted in the preparation of "A Soybean Production Guide" which will be completed in 2003. The guide will be used for training farmers and extension officers.

Table 6. Fertiliser regimes evaluated, Belize

Regime 1	18:46:0 + K-Mag + Micronutrient mixture
Regime 2	18:4:0 + 0:0:60 + Micronutrient mixture
Regime 3	14:36:12 + Micronutrient mixture
Regime 4	0:21:21 + 14S + Two Foliar applications

Peanut (*Arachis hypogaea* L.)

Over the last decade CARDI scientists in Belize developed and transferred technological packages for peanut production to small farmers. This included locally fabricated equipment and implements to assist in production and post harvest activities. As a result, Belize is now self-sufficient in peanut and regularly exports to other CARICOM countries. Under the Peanut Collaborative Research Support Programme (CRSP) emphasis was placed on investigating and identifying suitable methods for maintaining post harvest quality and reducing pro-

duction costs. The latter was to be achieved through improvements in harvesting, threshing, shelling, drying and storage operations.

Activities in 2002 focused on screening and evaluating peanut cultivars/lines with characteristics as good as or better than cultivars currently in commercial use. The characteristics under review include tolerance/resistance to foliar diseases, yield, days to maturity, tolerance/resistance to lime induced chlorosis, kernel size, suitability for specific end uses. Efforts were also directed at identifying cultivars/lines for specific end uses such as the manufacture of peanut butter and salted nuts.

In an unreplicated preliminary varietal evaluation trial planted in June 2002, 42 entries were tested. Three were found to be resistant to rust disease and seven were moderately resistant to leaf spot disease. A significant number of entries performed better than the control Tennessee Red.

Also in June 2002 a Peanut Variety Evaluation Trial, with four replications was conducted using 12 cultivars/lines. All entries attained 50% flower in 23 to 32 days after planting. However, there was no significant difference in yield among cultivars. Two entries were found to be highly tolerant to leaf spot and rust diseases as compared with the control Tennessee Red. Work will continue on the identification of cultivars that are high yielding, resistant to foliar disease and which satisfy other characteristics.

Cowpea (*Vigna unguiculata* (L.) Walp,)

Cowpea has become an important non-traditional export crop for Belizean farmers with production in Belize increasing from 365 ha in 1993 to 2,426 ha in 2001. Annually, Belize exports over 90% of the crop with a value in excess of EC\$4.05 million in 2002.

CARDI continues to work to screen new cultivars/lines and to identify for commercial production those that perform best under local conditions. In a replicated variety evaluation trial planted in late November 2001, ten cultivars/lines were evaluated. It was found that there was no significant difference in yield among the entries.

The Cayo district has been the focus of commercial cowpea production, but in 2000, the production area was expanded to include the northern Orange Walk district. Technical assistance was provided to a number of producers in production technologies, particularly in weed, pest and disease management.

Corn (*Zea mays*)

Belize is self-sufficient in corn and preliminary production statistics indicate that approximately 28,500 t of mechanized corn were produced on about 11,150 ha at an average yield of 2,555 kg/ha. Improvements in both crop yield and quality and reduction in post-production losses will increase farm incomes and the standard of living of farm households and rural communities. Significant levels of the desired improvements can be achieved through the use of improved technologies. These include superior varieties/cultivars, better quality seed material and the adoption of improved crop production and post harvest handling practices.

Yellow hybrid corn cultivars were evaluated in a replicated trial with 11 entries in the main May/June crop season. It was found that there were no significant differences among the entries for either field weight or shelled grain weight. The entries also showed no significant difference in their response to fungal diseases caused by *Curvularia* sp. and *Helminthosporium* sp.

An international yellow hybrid corn trial was run concurrently by the International Maize and Wheat Improvement Centre (CIMMYT) in collaboration with the 2002 Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alimenticios (PCCMCA). This trial was carried out with 10 entries planted in the May/June season. The results were similar to those for the yellow hybrid corn trial, with no significant differences recorded among the entries for both field weight and shelled grain weight at 14% moisture content. In another trial to examine the performance of 11 white hybrid corn entries, there were also no significant differences among the entries in the parameters measured. This evaluation work is being carried out to provide farmers with the very best seed possible in order to maximize their incomes.

Vegetables

Callaloo (*Amaranthus* sp.)

Callaloo is a traditional staple in the Jamaican diet and is also an important export commodity generating income for local farmers. The volume of production is reported to have increased by 51% to 17,796 t between 1991 and 1995. However, exports have declined by some 30% despite a 120% increase in value. This reduction is attributed in part to severe damage caused by insects particularly in the hot months of April to June. Callaloo harvested for fresh market export is particularly affected by the presence of insects, a major cause for rejection.

Based on studies carried out by CARDI in Jamaica, a pest management strategy using an IPM approach has been developed for callaloo. This strategy can also be used for other crops. Elements of the strategy include the application of an action threshold for the Lepidopteran complex (larvae) infesting callaloo when control is based on a grower standard insecticide (lambda-cyhalothrin); exclusion tactics and the evaluation of more effective, safer pesticides for controlling the major pests of callaloo.

The emphasis has been on the rationalization of pesticide use to increase consumer safety and to reduce environmental and user hazards.

A study was carried out to investigate the persistence of pesticides used on callaloo leaves treated with Karate® (lambda-cyhalothrin), Pegasus® (diafenthurion), Decis® (deltamethrin), diazinon and malathion. Leaf samples taken at 0, 3, 8 and 15 days after application will be processed and the extracts analyzed at laboratories at Ohio State University using gas chromatography. The analysis will be done to determine residue levels at the different time intervals and to calculate half-lives (t_{50}) of these insecticides on the leaves. The analysis is due in 2003.

Two IPM strategies were validated at five sites in Jamaica. The pest management strategies employed at each site were:

1. exclusion of major pests using a row cover of 70% light transmission in combination with cultural practices, and
2. the use of new biorational pesticides in combination with cultural practices.

The biorational pesticides used as needed were Spintor® (spinosad) and Confirm® (tebufenozide). Safer Insecticide® (an acaricidal soap) and fungicides Kocide® (copper hydroxide) and Champion® (copper hydroxide) were also used. The biorationals gave good crop protection against Lepidopteran larvae, as compared to the grower standard, in treatment plots monitored using the threshold-based sampling plan and spray decision guide. The two strategies gave improved plant protection against Lepidoptera species and demonstrated the potential to reduce pesticide use in this cropping system by 75–92%. This has immediate implications for cost reduction and food safety, both of which are critical issues in the sustainable development of cropping systems for callaloo. These are the technologies that CARDI is developing to improve the incomes of farmers in the region.

Fruit Crops

Mango (*Mangifera indica*)

Over the past 5 years, scientists in the CARDI Dominica Unit have collaborated with the Ministry of Agriculture, to provide technical assistance to the Dominica Export Import Agency (DEXIA) in forecasting the yields of Julie mango. This was aimed at providing reliable and timely estimates of the potential volumes available for export and in so doing, facilitate contractual and marketing arrangements. In order to enhance this exercise, a “desktop” method was employed using historical (1997–2001) data collected from 25 farms to estimate the main season yields for 2002. The desktop estimates were then compared with the actual counts taken.

However, the methodology did not provide very reliable estimates and it appears that other factors such as climate, number of new trees coming into production and the level of blossom drop due to high winds play a significant part in the ultimate yield of the crop in any given year. The main supplies of Julie mango come from the west coast of Dominica.

Pest and disease management

In the West Coast the percentage fruit fly infestation increased from 6% over the period 1997 to 1999 to an average of 36% from 2001 to 2002. This was most likely due to the continued neglect of the orchards by farmers because of market uncertainty. In the other districts, the level of infestation ranged from 6% to as much as 15%. There is the indication that on some farms the score for anthracnose will exceed the permissible export range of 0–3. The tendency towards the increase in anthracnose is due to the fact that canopy management (pruning) and fungicidal spray applications have not been carried out for at least 3–5 years. The re-establishment of “task teams” is required to facilitate the continuous maintenance of the Julie mango orchards.

Golden apple (*Spondias cytherea*)

One of the disadvantages of the present golden apple production system in Grenada is that production comes from very tall trees which makes harvesting difficult. Previous trials in which scions from traditional large fruited types were grafted onto seedling rootstock of the small-fruited dwarf type were partially successful. Partial success resulted since the grafted trees produced large fruits, but the trees were still too tall for harvesting. It was observed that a tree that had been topped to a height of 0.9 m produced secondary growth to a height of 4.27 m and large fruits within one year. A trial was consequently initiated in mid-2001 with 6-year old grafted golden apple trees (large fruited scion on dwarf seedling rootstock) heavily pruned back to a stem height of 1.0 m.

The results have been encouraging in that the canopies of the secondary growth range from 0.1 to 10.0 m. Branches occur from as low as 0.3 m above the ground. The trees have produced fruit just after one year with fruiting taking place as low as 0.2 m to 6.0 m throughout the tree canopy. Although many branches of the tree canopy are low, many are still higher than desirable as shown in Table 7.

Early results from this research demonstrate that it is possible to produce large golden apple fruits just about one year after plant establishment. This is good news for farmers wishing to establish golden apple as an orchard crop.

Table 7. Height of fruit and secondary growth on pruned golden apple trees, Grenada

Tree No.	Fruit height (m)		Height of tree (m)
	Minimum	Maximum	
02	0.9	5.8	8.5
04	0.9	3.7	7.6
06	0.9	3.7	7.6
10	0.9	4.5	7.3
12	1.2	5.1	7.6
14	0.3	6.0	7.3
16	0.3	6.0	9.4
18	0.9	4.5	9.4
20	0.6	4.5	10.1
22	0.2	4.0	9.8
25	2.1	4.5	8.5
27	1.4	3.4	8.5
29	0.6	3.0	5.5
30	0.9	4.9	7.6
32	0.3	4.3	9.1
34	0.2	4.5	7.9
36	0.9	4.9	9.1
38	0.9	3.7	9.1
39	0.6	4.5	6.7

Although, efforts to graft golden apple scions on to rootstock of other *Spondias* species such as red and yellow plums have been successful in the nursery, the survival rate in the field has been low since poor root development occurred in the nursery. Further work is being carried out with grafting on rootstock established in the field.

Papaya (*Carica papaya*)

Bunchy top and *Erwina* diseases (bacterial decline) continue to be the two most limiting factors to papaya production in Grenada. In 2002 CARDI tested a system of disease management that consisted of using extremely hardened seedlings for crop establishment. Fertilizers that did not contain the ammonium ion were used as part of the control mechanism. It is now understood that the ammonium ion weakens the plant tissues thus making them very susceptible to bunchy top disease. In addition, the papaya was intercropped with established Julie mango, which acted as a windbreak and as a barrier to impede the movement of *Empoasca* sp., a vector of the bunchy top disease.

It was observed that the incidence of bunchy top followed the normal progression formerly observed for plots not treated with insecticides. After one year of growth, 30% of the plants were affected by the disease, however, there was no significant decline in yield as a result. This demonstrates that economic production of papaya is still possible in Grenada when a cultural approach is used.

Pineapple (*Ananas comosus*)

In Dominica, pineapple is one of the main crops in the diversification programme. Farmers growing this crop have received technical assistance from a number of agencies, including the Chinese Agricultural Mission of the Republic of China (ROC), the Ministry of Agriculture, CARDI, DEXIA, IICA and the Nature Isle Pineapple Producers' Association (NIPPA). Market studies have shown that there is a demand of approximately 9,000 kg per month in Barbados, St Lucia and Antigua with Barbados being the main market.

The productivity of the cultivar Smooth Cayenne was studied in three agro-ecological areas that ranged from a dry zone with a marked dry season from January to April to a wet zone without a pronounced dry season. Differences in fruit weight were insignificant due to location. The Brix (16.48) of fruit grown in the intermediate zone (wet/dry) with a marked dry season from January to April was significantly higher than that of those grown in

the other zones (14.67 and 14.74). This research will enable CARDI to recommend specific varieties for varying agro-ecological zones in order to optimize production from those areas.

Traditional Crops

Coffee (*Coffea arabica*)

Achievements in the biological control of the coffee berry borer (CBB) [*Hypothenemus hampei* Ferr.] during 2002 were centred on the mass rearing of the parasitoids. Cultures of *Phymastichus coffea*, a parasitoid of the adult CBB were imported into Jamaica from Honduras in April 2001 and September 2001. A second importation of *P. coffea* in February 2002 was necessary due to the unexpected fungal contamination of cultures that was observed between November 2001 and January 2002.

There was some recovery from the widespread contamination of cultures with the fungus, *Aspergillus* sp., as was evident in the production of 110 *Phymastichus coffea* adults during the period. However, there was no production of *C. stephanoderis* during this period as these cultures had been severely infected by the fungus, resulting in the eventual expiration of cultures of this parasitoid.

A total of 61,982 adult *C. stephanoderis* were produced between March and early December 2002. The rearing activity was severely affected in July by poor host quality as the previous crop had ended and the new crop was in its initial stages. This meant that the number of suitable berries for culture establishment and the resulting number of adult CBB which could be collected from these infested berries to establish new cultures were increasingly limited. Increases in mites and fungal infestations were recorded later in the year, during the period August to October, 2002. Rearing of the host was not carried out during the quarter due to the limited availability of CBB-infested coffee berries.

A meeting held at the end of November 2002 between CARDI and the Coffee Industry Board (CIB), agreed to a two-year extension of the project, "Biological control of the coffee berry borer,

Hypothenemus hampei Ferr." The extension would facilitate the completion of activities conducted in Year III of the project and not completed due to the devastating effect of the fungus (*Aspergillus* sp.) on the production of the parasitoid. The contract was signed by CARDI in June 2002. During the extension period, attention will be focused on the dispersal and establishment of the parasitoid, *Phymastichus coffea* in the field. The project will also focus on determining the efficacy of the parasitoids, *Cephalonomia stephanoderis* and *P. coffea* in reducing CBB infestation in the field.

Sugar cane (*Saccharum* sp.)

Scientists at CARDI provided technical assistance to the Barbados sugar industry by the mass rearing and release of the parasite (*Cotesia flavipes* Cam.) This parasite is a larval parasitoid of the sugar cane moth borer (*Diatraea saccharalis* Fabricius) which is one of the major pests of the crop.

Fields with a level of infestation greater than the Economic Threshold Level (ETL) of 5% were identified during the island-wide, sugar cane joint infestation survey. A total of 9,321 parasites were released during the year in various locations across the island. In the survey, 139 fields were sampled, representing 5% of the total area planted. The overall infestation level averaged 2.5% which was below the ETL. The mean percentage joint infestation of the six major commercial varieties for the 2001–2002 sugar cane crop is shown in Figure 1.

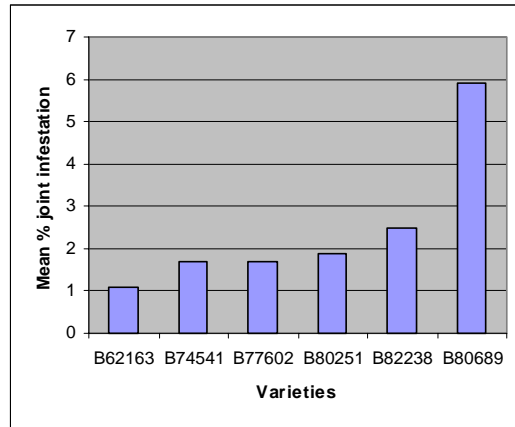


Fig. 1 Mean percentage joint infestation of the six major commercial varieties for the 2001–2002 sugar cane crop, Barbados

The results followed the same pattern of joint infestation that was recorded for the 2000-2001 sugar cane crop. The level of infestation in B80689 was again well above the ETL as was the case in the prior season when it was 6.1%. As in previous years, the level of joint infestation was higher in plant cane than in ratoon crops but there were significant differences due to rainfall in different zones. It is estimated that biological control of the sugarcane moth borer continues to save the industry in Barbados in excess of EC\$2.7 million annually.

Organic Crop Production

CARDI has been working with national and regional partners to support the development of the organic agriculture industry. In **Trinidad and Tobago**, the Institute has been working closely with the Inter-American Institute for Co-operation on Agriculture (IICA) to develop and implement a production audit of local ecological farms. The audit of a sample of reputed organic/ecological farm units was completed in March 2002. A total of 29 persons were interviewed with 17 farms assessed as appropriate for auditing. The audited farms were located in Trinidad and were dispersed across the country in various geographic zones. None of the farms were ever registered with an organic certification agency.

The major findings indicate that the practices of organic farmers in Trinidad appear to be generally structured along the programmes of conventional, chemical input-dependent agriculture. The majority of local organic farmers utilise the same seed, tools, land preparation operations, planting densities and cultural operations of chemically dependent agriculture. The main divergence from conventional systems appears to be the use of compost, the non-use of herbicides, and an increased degree of crop diversity. The crop fertility programmes appear to be based on substituting organic material (composts and manure) for synthetic fertilisers and there is an absence of intentional, pro-active soil improvement programmes. The crop protection practices appear to be culturally based, with crop rotation and the selection of resistant cultivars identified as the main strategies.

However, more detailed analyses of the crop protection practices revealed a programme with too few options for effective pest management, a lack of integration of options and practices unrelated to the ecology of the pest/disease organism and crop plant. There was limited use of effective, low cost and easily made pest control devices such as yellow sticky traps. Basic organic techniques such as prevention of weed-set, compost production and beneficial habitat management and buffer zone establishment were generally not systematically practised.

The audited farmers were generally unaware of the high level of regulation in the trade of organic produce. Fourteen of the 17 farmers audited did not possess a copy of the organic certification standards of a certification programme, and of even more concern, they did not have a materials list, which states the allowed, restricted and prohibited materials. The need for record keeping, which is a critical requirement for certification, was not widely appreciated by the audited farmers and no farmer had a programme for audit trail management capable of verifying adherence to organic standards.

The results of the audit indicate that there are critical technical and information gaps at the production level, which can severely constrain the development of organic farming. Information and technology transfer interventions through the organic movement are recommended to address the information deficit.

The deficit can also be addressed through other stakeholders involved in food handling and distribution and the policy makers.

CARDI also carried out organic farming studies in Jamaica, to compare the effect of three organic manures (goat and cow manure and vermicompost) on the growth of callaloo. The plots treated with cow manure had consistently higher marketable yields than those to which the other soil ameliorants were applied. However, this was only statistically significant for the first harvest. Further work is required before recommendations can be made to organic farmers.

Natural Resource Management

CARDI was part of a team coordinated by the Centre of Marine Studies (CMS) which undertook a review of soil management and farming practices including the use of agro-chemicals in the Caribbean with particular reference to **St Lucia** and **Jamaica**. This project, entitled *Impact and Amelioration of Sediment and Agro-chemical Pollution on Caribbean Coastal Waters*, was as a result of a Memorandum of Understanding (MOU), signed between the CMS located at the University of the West Indies (UWI) and The University of York/Marine Resources Assessment Group (MRAG) Ltd of England in 2001. The project was funded by the UK-based Department for International Development (DFID).

As part of this review three reports were produced in 2001, namely:

- The characterization and quantification of farming units
- A literature review of farming systems in Jamaica
- Appraisal of existing national legislation, national/international agriculture policy measures and potential future impacts

During the period November 2001 to March 2002, a survey was carried out on the farming practices of both large and small-scale producers in the Rio Cobre and Wag Water River watersheds in **Jamaica** and the Roseau, Prasin and Soufrière watersheds in **St Lucia**. The data embodied in the three preceding reports were supplemented with data from this survey and a preliminary examination was conducted.

Further examination of the data from **Jamaica** indicates that soil management was not related to soil properties, as less than 20% of farms had done soil testing, but 95% applied some form of fertiliser. Only 40% of hillside farmers indicated that serious steps were being taken to control soil erosion. There was extensive use of chemicals for pest and disease management, and indications that more chemicals would be used if resources were available.

The data from **St Lucia** indicated that in general, farming was not done on slopes as steep as those in **Jamaica**. Also, only 20% of the farmers had soil analyses done although the use of chemical fertilisers was widespread. There were no meaningful efforts to decrease soil losses from water erosion.

These findings indicated a need for training intervention, which was presented in the final report to MRAG.

Small Ruminants

The goal of CARDI's small ruminants programme in **Jamaica** is to contribute to the development of a sustainable small ruminant industry through the generation and demonstration of component production and post harvest technologies. Additionally, the development of cost-efficient sustainable production systems and the training of extension agents, farmers and other stakeholders form part of CARDI's mandate.

At the Hounslow Demonstration Centre the focus has been on the development of cost-efficient production systems based on forages. Hence, improved forage grasses and legumes have been evaluated for adaptability and biomass and nutrient production. In the last quarter of 2001 trials were started to evaluate two locally adapted forage legume species, pigeon pea (*Cajanus cajan*) and blue pea (*Clitoria ternatea*) with the view to including them in feeding systems for small ruminants. The effect of season of sowing (October 2001 vs. March 2002) was studied. Data has so far been collected on biomass yield, cutting interval and their interaction. The results will allow CARDI to recommend to farmers the best means of feeding these traditional legumes to their animals. The research will be completed at the end of 2003.

The Sam Motta Goat and Sheep Demonstration and Training Centre is the hub for the development, distribution and monitoring of breeding stock for farmers in close proximity to the Centre. A purebred Boer buck, two purebred Nubian bucks and a purebred Alpine buck were used in the breeding programme. More recently, a decision was taken to place more emphasis on the development of a pilot milking operation and therefore, a greater percentage of the dams is now being bred to the Alpine buck, the milking breed.

A total of 25 does of different breeds and types were bred by the Alpine buck. These animals are expected to kid early in 2003 to coincide with the startup of the pilot milk operation. This exercise will lead to increased incomes for goat farmers as they diversify their production base to include milk in what has been a predominantly meat-based industry.



Hon. Roger Clarke, Minister of Agriculture, Jamaica, hands over goats to participants in the Goat Commercialization Project



A proud farmer displays a Nubian buck acquired from the Sam Motta DTC

In July 2001 the Small Ruminants Network (CASRUNet) undertook an analysis of the local industry in **Trinidad and Tobago** and identified the major priority constraints. Out of that process, Johne's disease and helminthosis were identified as the most important health problems facing the small ruminant industry .

Johne's disease, also known as paratuberculosis is an infectious, contagious disease of all ruminant animals, including cattle, sheep and goats. It is a chronic, wasting disease that causes considerable production losses in adult animals and is caused by *Mycobacterium paratuberculosis*, a bacterium of the same genus as the bacteria causing tuberculosis in humans, cattle and other species. Although the true prevalence and economic losses associated with the disease are unknown in Trinidad and Tobago and the rest of the Caribbean, slaughterhouse studies in the USA for example, have indicated that between 2 to 18% of cattle slaughtered are infected with *M. paratuberculosis*.

Johne's disease was identified in the flock at Blenheim, a sheep multiplication and research facility established in Tobago, for the breeding and development of tropical hair sheep. In a survey conducted in 2001, the infection rate was found to be 11%. It is believed that this has reduced the productive capacity of the flock, and given the fact that it is a national breeding station, the potential for spreading this debilitating disease is enormous. The disease has also been discovered in the flock at the Animal Breeding Unit at the Government owned Centeno Livestock Station.

As a consequence, in 2002, CARDI began work with the Veterinary Division of the Ministry of Agriculture, Land and Marine Resources (MALMR) and the UWI School of Veterinary Medicine to develop a project to address the problem of Johne's disease in Trinidad and Tobago. Towards the end of the year, a collaborative project between CARDI, IICA, UWI and MALMR was undertaken to assess the extent and prevalence of the disease in the country and develop appropriate strategies for its management and control. The successful execution of this project will result in a model that can be used anywhere in the region where small ruminants are important. Funding for the major activities of this project is expected in 2003.

A helminthosis survey was carried out between May-July, 2002 in Tobago to provide the basis for developing effective measures to control internal parasites in small ruminants. A direct relationship (Figure 2) was found between the number of adult animals owned and the expenditure on anthelmintics. Approximately 23% of the respondents spent between EC\$2.60 and EC\$3.50 on anthelmintics per adult animal. It was discovered that Hunter 10[®] (Fenbendazole) was the most common anthelmintic used by farmers. Not surprisingly, it was also the product most used and most recommended by veterinary professionals. Agro-shops also reported this product as the most popular among farmers.

As a result of this research, CARDI, in collaboration with its partners, will develop procedures to train farmers and agro-shop owners in the correct use of anthelmintics. Additionally, a project focusing on the management of parasite resistance as a consequence of the indiscriminate use of drugs has been developed and will be submitted for funding in 2003. This work is contributing to effective flock and herd health management as part of the overall goal of national small ruminant industry development.

CARDI is also working in Tobago to develop forage-based feeding systems and in this regard more than 500 mulberry (*Morus* sp.) plants were established at Goldsborough for distribution to farmers. Mulberry is a highly nutritive forage tree and so far, some 15 farmers have benefited from the project.

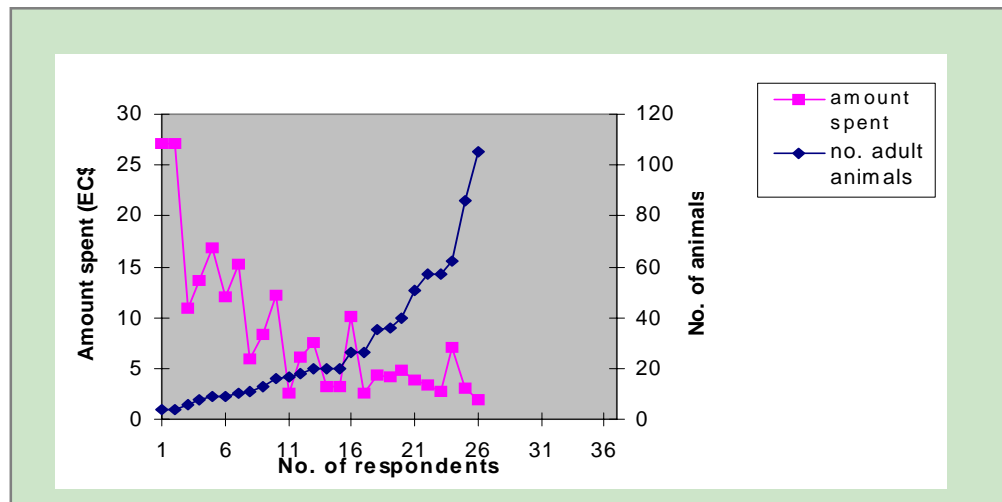


Figure 2 Relationship between number of adult animals owned and cost of treatment

PROCICARIBE

- NARS Institutional Development
 - Resource Mobilisation
 - Network Activities
 - Global Linkages

During the period under review there was a restructuring of the PROCICARIBE operations, due to a number of administrative changes. In May 2002, the Executive Secretary, Dr Compton Paul demitted office and Dr Francis Asiedu, the CARDI Livestock Scientist in Jamaica, took over supervision of the PROCICARIBE System.

NARS Institutional Development

The Secretariat continued to facilitate the work of the National Coordinating Committees (NCCs) and the National Network Committees (NNCs) in member countries. Researchers from Barbados and Trinidad and Tobago attended an IPM-CRSP regionalisation workshop entitled "Development of IPM in Leafy Vegetables that Currently Experience High Pesticide Input", held in Trinidad in collaboration with the Ministry of Agriculture, Land and Marine Resources. Under the global IPM-CRSP project, Jamaica is the host country for the Caribbean region and as such these regional workshops are held to ensure that the wider Caribbean has access to research and technology developed under the project.

Participants were trained in a stepwise approach towards the development of IPM strategies for pesticide-reliant vegetable systems, which was developed from experiences with vegetable amaranth (callaloo) in Jamaica. The workshop dealt with IPM for leafy greens and the potential of using this approach with Lepidopteran pests. The participants were also introduced to web-mapping as a technique for pest monitoring.

The Secretariat also organized a one-day training workshop for the caterers of the School Nutrition Programme in Trinidad. The effort was geared at improving post harvest handling and storage of fruits, vegetables and root crops. CARDI's post harvest specialist, Ronald Pilgrim, facilitated the workshop

The Secretariat facilitated funding from the CTA for five Caribbean scientists to participate and present papers at the Thirty-eighth Meeting of the Caribbean Food Crops Society (CFCS) held in Martinique in 2002.

Resource Mobilisation

A major focus of PROCICARIBE's work was resource mobilisation for projects developed in the various networks. Activities geared towards the mobilisation of resources to carry out network activities resulted in the preparation and submission of a number of funding proposals as shown in Table 8.

Table 8 Projects proposals submitted for funding

<i>Source of Funding</i>	<i>Network</i>	<i>Project description</i>
Mexico/ Central America	CLAWRENET	Watershed data collection
Caribbean /OAS Agreement	CLAWRENET	Pesticide use management
	CLAWRENET	Training in land and water resources
	CAPHNET	Post harvest technology
CARICOM/ Mexico/ Agreement	CASRUNET	Development of small ruminant production and marketing systems
	CAPGERNET	Enhancement of the management of plant genetic resources

In 2002, the Institute committed US\$60,000 to PROCICARIBE under the IICA/CARDI Agreement to support network activities and in particular those that were directly or indirectly related to the commodities identified under the RTP.

Network activities

CAIS

The Caribbean Agricultural Information Service (CAIS) brought regional coordinators of the PROCICARIBE Networks together for a one-day training workshop entitled *Electronic Networking: Making the best use of electronic fora*. The objective was to demonstrate the key features of electronic groups available to support the use of electronic means of communicating and exchanging information among network members.

Regional coordinators and CAIS Network members also participated in other training workshops during 2002. (*See Information and Communication section for more details.*)

CAMID

The Caribbean Agribusiness Marketing Intelligence and Development (CAMID) Network developed a Regional Integrated Marketing Strategy (RIMS), aimed at elaborating mechanisms to facilitate the integration of the major marketing services. These include marketing intelligence, trade facilitation, quality assurance and the supporting infrastructure. RIMS was presented to the Council for Trade and Economic Development (COTED) of CARICOM at a meeting held May 2002 in Guyana. In June 2002, at the request of the Caribbean Agribusiness Association (CABA), the RIMS was presented in Barbados at a meeting of the Alliance for Sustainable Development.

CAPGERNET

Work done by CARDI in Barbados produced three breeding lines (CARDI Green, CARDI Red and CARDI Purple) that were advanced to the S₅ and S₆ generations. These will be evaluated in the Caribbean Regional Hot Pepper Varietal (CRHPVT) trial in 2003. These breeding lines were extracted from the heterogeneous West Indies Red population in response to complaints that the fruits of this variety were too variable in size, colour and shape.

Additionally, 13 Caribbean hot pepper landraces have been bred to a high degree of uniformity and stability. Pure seed will be produced in 2003 to supply the CRHPVT as well as basic seed for the commercial seed multiplication system in the Antigua and Belize Units.

The next activity was selection among the segregating generations of the Scotch Bonnet x Bird Pepper cross. The selection criteria were plant ideotype, large robust individual plants with many branches and as little disease symptoms and pest damage as possible. The selected berries were large, blocky, dark green, aromatic, very hot, thick pericarp and attractive. To date, 45 F₅ individuals have been selected and isolated for pure seed production. The next step is early generation replicated trials for yield. From this number of selected F₅ lines one can reasonably hope to get at least two or three new varieties after this process.

CAPHNET

Regional Coordinator of the Caribbean Post harvest Technology Network Dr Linda Wickham and CARDI's Business Development Specialist Maurice Wilson participated in an EU project entitled *Safe and High Quality Food Supply Chains and Networks—Establishing an International Research Knowledge Network on Cross Border Food Supply Chains and Networks*. The objectives of the project are to establish a platform to bring knowledge on food supply chains and networks together to a world-wide scale and support further development of this knowledge by generating internationally attuned research agendas in participating countries.

The network also reported on activities in root crop research that is being carried out at the University of the West Indies on:

- shelf life studies in yam
- processing parameters for the production of yam chips
- production of dasheen chips
- development of cassava granola
- increasing the utilization of arrowroot

CARINET

A 10-day training workshop was conducted by the Caribbean Biosystematics Network (CARINET) on the identification of scale insects and their natural enemies. The Regional Coordinator, Dr Ronald Barrow also facilitated a Food and Agriculture (FAO) regional training workshop on pest identification. The objective of the workshop was to increase the knowledge of participants in the identification and management of pests of phytosanitary significance in the region.

CARIVEG

The coordination, implementation and information sharing within the Caribbean Vegetable Network (CARIVEG) have not materialized as proposed and agreed upon. Action is to be taken to re-vitalize network activities.

CAROT

The NNC of the Caribbean Roots and Tubers Network (CAROT) was successful in establishing a link between the School Nutrition Programme (SNP) in Trinidad and Tobago and cassava farmers. Roots and tubers were introduced on the SNP menu during the latter half of 2002. One of the expected outcomes from this initiative is that the number of meals prepared using roots and tubers will be increased in 2003.

CASRUNET

The Caribbean Small Ruminant Network (CASRUNET) was successful in implementing a large number of activities in the Small Ruminant Industry Development Plan. These included addressing the problem areas identified in the plan as reported by six (Barbados, Belize, Jamaica, St Kitts/Nevis, St Lucia and Trinidad and Tobago) of the twelve participating countries. Although no further progress was made on the industry policy proposal that was submitted to Jamaica, in St Kitts/Nevis, compilation was ongoing by the legal department on pieces of legislation that impact livestock production.

In order to protect the Barbados Blackbelly sheep, considered that country's premier indigenous genetic resource, a programme was started to establish the deoxyribonucleic acid (DNA) profile of the breed. In Jamaica, 200 goats (Boers, Nubians and Alpines) and 50 sheep (Dorper, Katahdin and Suffolk) were imported as breeding stock.

Also in Jamaica, improved feeding and production systems for small ruminants based on locally adapted legumes—*Cajanus cajan* and *Clitoria ternatea*—were evaluated.

Training and human resource development featured among the successes of the network. Jamaica benefited from a seminar on *Dairy goat genetics* conducted by a team from the Maryland State Department of Agriculture and one on *Goat production and management—The way forward* by Dr Thian Hor The, the renowned geneticist from the Texas A&M University system. Belize also held three seminars on health management of sheep for the benefit of farmers and extensions officers.

CIPMNET

National coordinators of the Caribbean Integrated Pest Management Network (CIPMNET) met in Trinidad in March 2002 at the First Technical Meeting of the Regional EU-CARIFORUM Caribbean Agriculture and Fisheries Programme (CAFP). The Integrated Pest Management Project (IPM) has a budget of Euro 1.1 million which will be used to fund the following sub-components: introduction to farmer Field Schools; biological control interventions on papaya mealy bug, citrus blackfly and hibiscus mealy bug; development of the region's biosystematic capabilities; compilation of a regional database on R&D activities on whitefly and whitefly transmitted viruses; the determination of the distribution of coconut lethal yellowing disease and the identification and compilation of regional plant health polices. It is expected that the National Coordinators of CIPMNET will benefit from this project through training. CARDI, the executing agency for the whitefly component of the CAFIPM project, utilized the network members in a data collection exercise throughout the region.

The Institute signed a contract with the CTA on behalf of the Secretariat for the production of a resource guide and three videos on ecological crop management. Work on the guide and videos began late in 2002 and they are scheduled for completion in mid-2003.

CLAWRENET

The Caribbean Coastal and Marine Environment workshop was co-hosted by the Caribbean Land and Water Resources Network (CLAWRENET). Following the workshop, a small committee was established. It was envisaged that the group might function as an extracurricular task force/committee/working group to support existing initiatives to address the protection and management of the Caribbean marine environment and resources. CLAWRENET also co-hosted the Global Environment Change and Food Systems (GECAFS) workshop to examine the effects of global climate change and the Caribbean Food Systems.

The workshop was aimed at identifying and establishing clear priorities for policy-relevant research issues within the GECAFS framework that could contribute to existing and planned regional programmes.

Following the workshop, a small committee prepared a draft paper entitled *Impacts of Climate Change on Caribbean Food Systems* and presented this to COTED in May 2002. In Trinidad, the committee also hosted a preparatory meeting entitled *Developing a Research Agenda for the Caribbean Food System* to respond to global climate changes. Another workshop entitled *Research Issues* was held in St Lucia. The results of both meetings can be viewed at the GECAFS website:

<http://www.gecafs.org/meetings/Meetings.htm>

The textbook entitled *Land and Water Resource Management in the Caribbean*, edited by Drs Compton Paul and Jacob Opadeyi was published and copies distributed.

CRIDNET

The EU continued to finance the work plan and budget requirements for year-3 of the Caribbean Rice Industry Development Network (CRIDNET), with headquarters in Guyana. The NNC in Trinidad assisted the local Ministry of Agriculture in the preparation of a rice policy document and also handed over 4,000 kg of certified rice seed to the Trinidad Island-Wide Rice Growers Association.

Global Linkages

The International Maize and Wheat Improvement Centre (CIMMYT) provided a two-week training course in seed technology for Julius Ross, a CARDI Horticultural Scientist based in Antigua and Barbuda. This training is expected to enhance CARDI's seed programme for hot pepper. PROCICARIBE co-hosted a workshop entitled *Status and Performance of Diversification Initiatives of Caribbean States* with the Department of Agriculture of the University of the West Indies (UWI). The workshop was held under the sponsorship of the EU.

The Regional Coordinator of CARIFRUIT, Judith Francis, represented PROCICARIBE at the Third Meeting of the Regional Forum for Research in Agriculture (FORAGRO) held in Brasilia, Brazil in April 2002. Ms Francis also participated in and coordinated a Caribbean delegation to the FORAGRO Executive Committee Meeting.

PROCICARIBE prepared and displayed a booth exhibit entitled *PROCICARIBE in Priorities* featuring its products and achievements. In a project funded by The Technical Centre for Agricultural and Rural Cooperation (CTA), the Secretariat facilitated regional consultants in conducting a feasibility study on the establishment of a Caribbean regional agricultural policy network.

Information and Communications

- Information and Communication Services
 - Corporate Communications
 - Collaborative Projects
- Caribbean Agricultural Information Service
- CTA Regional Branch Office for the Caribbean

This programme is engaged in developing the Institute's internal information and communications systems and resources, while also playing a major role in improving the information and communications capacity of the wider agricultural sector. Highlights of the activities in 2002 are outlined below.

Information and Communication Services

The Information and Communications Department continued to meet its objective of developing and coordinating appropriate systems, policies and procedures for handling CARDI's corporate and technical information resources.

Information Technology Services

A preliminary inventory of the Headquarters' information infrastructure was completed. One new server was purchased to deal with the decline in the level of services brought about by the failure of two servers in the Local Area Network (LAN). In the short term, another new server will have to be acquired, even as efforts are made to fund the replacement of other hardware, and achieve a general upgrade in the Information Technology (IT) infrastructure within the Institute.

Information and Records Centre

The Information Centre's, Question and Answer Service (QAS) handled over three hundred questions during the year. Information on vegetables, fruit and tree crops were the most frequently requested. Researchers, students, farmers, policy

makers and other information centres, made up the bulk of the users. The QAS at the CARDI Headquarters is a part of an increasingly regional service, with the ongoing development of similar centres. The Centre also completed the cataloguing and classification of approximately 400 documents; 75 of which were added to the AGRIN database, which now holds close to 11,000 records. The Records Unit, which handles requests for internal information, continued to support the development of improve access to CARDI's corporate files and records. However, during 2002 there was a greater emphasis on the upgrade of the file classification system.

Publication Services

The Publications Unit responded to increasing demands for desktop publishing and reprographic services to prepare in-house reports and publications. This increase in demand was driven by greater emphasis on dissemination of technical and corporate information, and in particular the introduction of a Corporate Communications programme. The unit provided technical assistance, including design of posters, preparation of press releases and advertisements, brochures and flyers, as well as advice for layout of exhibition of booths. In addition to the above, the Publications Unit produced well over 200,000 copies of documents, offered report binding, design and layout services for documents, reports and workshop materials.

Corporate Communications

The Institute increased its efforts in corporate communication through the establishment of a Corporate Communications Committee. This Committee is made up of a multi-disciplinary team of staff members, coordinated by the Information and Communications Department. In collaboration with the wider Institute, the Committee developed a new slogan and "Message." The slogan which can now be found on all CARDI stationery and publications is—*Improving Lives Through Agricultural Research*. The key message statement is *Enhancing the socio-economic well-being of Caribbean people through research that improves the competitiveness and sustainability of regional agriculture*. In addition a revision of the general brochure on CARDI was completed.

The Committee also developed a work programme that identified priority areas for attention in corporate communications within CARDI. Given the limited resources available, funding continues to be sought to further develop and implement the overall programme in the medium-term. However in the short-term the in-house team continued to formulate guidelines and coordinate the design of more appropriate communication products and services to improve the reach of relevant information to all stakeholders.

Collaborative Projects

The three database templates— "Commodity", "Skills" and "Contact"— developed by a team of consultants under a CARICOM-Mexico Technical Cooperation initiative, were submitted to the unit for verification of the design. Once the databases meet the required specifications, they will become available for use.

CARDI continued work on a joint collaborative project with IICA, in which some staff members were trained in the use of CD-ROM Courseware, to prepare and build relevant content of subject matter into multi-media products. In a project continuing from the previous year, good progress was made in the production of CD-ROM training materials on hot pepper and dasheen.

Caribbean Agricultural Information Service (CAIS)

Since 1997 the Technical Centre for Agricultural and Rural Cooperation (CTA) has worked with CARDI to identify agricultural information needs in the Caribbean region, coupled with mechanisms to meet those needs in a sustainable manner. This is with a view to contribute to the sector's needs for increasing competitiveness within the agricultural sector. CAIS was developed as one response to these efforts. The work programme of CAIS is built around; network development; capacity building; generation and dissemination of information and sensitization and advocacy. Highlights of this programme's activities are presented below:

Network development and networking

The main activities consisted of technical assistance and administrative support to networks including:

- Maintenance of existing networks and support to the development of new thematic and commodity networks
- Encouraging the use of networking as a mechanism to assist the implementation of Question and Answer Services (QAS) at the national level
- The provision of guidelines, skills development and training in the area of network management

In January 2002 a new network was formed by participants attending a regional workshop hosted by CTA and CARDI to develop public awareness skills within farmers' associations and NGOs. This new network— the Caribbean Farmers' and NGO Network (CaFANN)—formed an interim committee to work with CAIS and other stakeholders, with a view to improving the communication and exchange of information among farmers and NGOs in the Caribbean. This joint effort resulted in the preparation of a project concept document for CaFANN.

Technical support was provided to other networks in the identification of potential areas for network development and in the preparation of proposals. At the national level there has been a good response to the concept of network development and a willingness to form local networks. However, local capacity remains limited, as a result of a shortage of relevant skills, transfers of personnel or

resignation. Thus, CAIS is continuously examining strategies to use information and communications technology and other resources to provide assistance to stakeholders in filling gaps identified in the national agricultural information systems.

Question and Answer Services (QAS)

CAIS continued to provide support to the consolidation of existing Question and Answer Services (QAS) in St Lucia and Jamaica. CAIS also assisted in the development of a new QAS Centre in St Vincent and the Grenadines, as part of a phased approach to the development and upgrade of local capacity to improve networking and information exchange. In 2002 there was continued focus on working with Ministries, organisations, associations and institutions that had received training in the Management of Question and Answer Services in 2001, and were actively seeking to upgrade their Information and Documentation Services. At the end of the period, the QAS Centres had handled over 1,200 requests for information in the Caribbean region.

Electronic Networking

During 2002, CAIS hosted a regional workshop aimed at improving the skills in, and level of use of electronic tools for communicating between and among network members. The workshop entitled *Electronic networking: Making the best use of electronic fora*, trained 15 participants from eight countries in the region. An electronic forum was set up for CASRUNET, the Small Ruminants Network. Participants recommended the hosting of similar meetings at national level targeting national network coordinators and members. The CAIS Secretariat has included this recommendation in its work programme for the medium-term and is actively seeking support for these activities.

Resource Mobilisation Skills

CAIS also initiated and subsequently worked as part of a joint CARDI and IICA team to coordinate and host a CTA funded workshop designed to strengthen resource mobilisation. The workshop team also collaborated with the International Livestock Research Institute (ILRI) and UWI, which both provided technical expertise to facilitate the workshop. The objective was to improve the capacity of network members to prepare and to seek resources in support of their respective programmes.

Strategic information programmes

In a number of cases, institutions at the national level do not have in place overall strategic plans to support information and communications activities. Even where such strategic plans exist, they have often not been translated into programmes to manage information and communications. Thus CAIS will continue to work with stakeholders at the national level to support this aspect of the programme through sensitization, training, and technical assistance.

Information policy

Limited information policy was identified as one of the weaknesses in the agricultural sector's efforts to improve access to information. In this regard, CAIS commissioned the research and collation of documentation summarizing electronic sources of information on agricultural information policy. This document was completed in 2002, published and distributed to policy makers and information and communication professionals in the Caribbean region. The document has proved to be useful in the development of local information policy by respective stakeholders, particularly at the national level.

Collaboration and linkages

Collaboration and linkages with other regional and international bodies were developed and maintained through the use of electronic fora, face to face meetings, and other means of communications. Contacts were also maintained with a number of regional and international bodies. In 2002, through the CAIS mechanism, CARDI engaged in joint activities with the CTA, Rural Universe Network Project (RUNetwork) of the German Centre for Documentation and Information (ZADI), Centro para Desarrollo Agropecuario y Forestal, Inc. (CEDAF), and the Caribbean Community (CARICOM), among others, as part of efforts to develop the regional capacity in information and communications management.

Advocacy and sensitization

Regional stakeholders have recognised the need to promote the strategic use of information for the development of the agricultural sector. As such, work was initiated on a marketing audit. The results of this audit will identify specific target audiences to be addressed in order to raise awareness and improve competitive and sustainable informa-

tion use in the agricultural sector. Once completed, the marketing plan will identify strategies to communicate the role of CAIS and respective national partners, in the improved use of information for agricultural development.

CTA Regional Branch Office in the Caribbean

The objectives of the CTA Regional Branch Office in the Caribbean (RBOC) were implemented through a number of activities aimed at :

- enhancing CTA's role in the Caribbean, and
- improving information services offered by CARDI, as well as Member States of the EU-ACP grouping in the region.

The RBOC coordinates a number of CTA projects, both in collaboration with a range of stakeholders in the region, or through implementing projects organised by CARDI.

An ongoing dialogue was maintained with clients and stakeholders through attending meetings, reviewing reports and by direct interaction with stakeholders, with a view to identifying their needs for publications, information and training. The CTA flagship publication *Spore*, along with other CTA publications and the Publication Distribution Scheme (PDS) were promoted and highlighted through a number of exhibitions and displays. Some of the larger exhibitions presented were as follows:

- A 2-day joint Promotion and Sensitization/ Training workshop on Presentation Skills held in Tobago, 25–26 February 2002
- 32nd Conference of the Association of Caribbean University and Research Institutions and Libraries (ACURIL) in Jamaica, 27 May –1 June 2002.
- 75th Meeting of ACP Ministers of Trade and 27th meeting of ACP-EU Council of Ministers in Dominican Republic 24–28 June 2002.
- 1st Caribbean Publishers Network (CAPNET) Bookfest in Trinidad 3–5 November, 2002

Efforts continued to upgrade the developed networks, through the mechanism of the Caribbean Agricultural Information Service (CAIS) and the Caribbean Agribusiness Marketing and Agricultural Development Network (CAMID), along with thematic and commodity networks. In this regard, support was given to the development of networking among the PROCICARIBE networks through the hosting of a workshop in electronic networking, as reported earlier. The CTA RBOC programme also provided funding for PROCICARIBE News, and continued to subscribe to selected publications so as to support the delivery of information services to the region.

CTA-supported studies on sweet potato and small ruminants initiated in 2001 were completed in 2002. Data collection and research on per capita consumption patterns on roots and tubers in selected Caribbean countries continued into 2002. The analysis of these results will provide information for the development of industry plans for respective commodities. Further details of these studies are provided in the section on Marketing and Agribusiness.

There was increased collaboration with agencies in the region particularly through attendance at meetings as well as participating in a number of ongoing electronic fora. Attending and coordinating regional meetings also assisted in providing updates on activities and identifying potential projects, particularly in the area of information and communications management. CARDI expanded its range of collaborators and shared its experiences from the Caribbean region with other CTA partners by attending meetings organized by CTA. The CTA hosts a meeting of the Information and Communications Technologies (ICT) Observatory where each year, ICT is applied to a specific theme. In 2002 the RBOC was represented at the meeting entitled Gender and Agriculture in the Information Society held over the period 11–13 September 2002, in Wageningen, Netherlands. The experiences resulted in increased gender awareness of ICT related issues and this will be reflected in the programmes and projects developed. The RBOC also exchanged experiences with other CTA partners in a meeting—*CTA Cooperation with Regional Organisations and Networks*—held over the period 17–18 September 2002. Collaboration with other CTA partners has been enhanced as a result of these interactions.

Ongoing evaluation is used as one mechanism to improve relevance and effectiveness of the CTA programmes. In this regard, the RBOC provided support to an evaluation of networks, as well as the evaluation of selected CTA-funded training programmes. The RBOC also provided technical assistance to stakeholders in the public, private and NGO groups, for conceptualizing, preparing, and submitting proposals to the CTA to source funding.

In collaboration with the CTA, the RBOC provided funding as well as organised and hosted or co-hosted a number of workshops during 2002. The workshops are summarized in Table 9 for easy reference, but some of these workshops have also been reported in other sections of the report.

A mission to present the CTA programme to selected stakeholders in Haiti was completed in collaboration with the CARICOM mission in Haiti. A number of potential projects were identified, including the development of information products in the native language 'Creole', to support the sharing and exchange of information and technology transfer to farmers. Training in the area of information management was also identified as a priority. The CTA's services were also promoted in the Dominican Republic through a mission supported by the Centro para el Desarrollo Agropecuario y Forestal, Inc. (CEDAF), and the IICA Office in the Dominican Republic. These visits provided more current information to allow the CTA to identify potential priority activities in both Haiti and the Dominican Republic, in an effort to increase support to these areas.

As a result of the expansion in the range of stakeholders and projects being implemented by the CTA in the Caribbean, the RBOC intensified work to upgrade its management information systems, documentation and policies, with a view to improving the efficiency of its services.

The activities outlined for 2002, supported the ongoing implementation of the new strategic framework at the CTA, and will be continued in the upcoming period. However, specific projects will be identified based on the results of evaluations and recommendations by stakeholders in the region, in 2002.

Selected Workshops organised and hosted by the CTA/RBOC



Public Awareness Workshop, Port of Spain, Trinidad



Table 9 Selected Workshops organised and hosted by the CTA/RBOC

- CTA/CARDI Regional Public Awareness Workshop, Port of Spain, Trinidad & Tobago, 21-25 January 2002 (25 participants)
- CTA/CAIS/CARDI Seminar on Presentation Tips for Networks and Researchers 25–26 February 2002, Scarborough, Tobago and 28 February–1 March 2002, St Augustine, Trinidad (50 persons)
- CTA/CARDI/CAIS: Regional Workshop on Electronic Networking 24 May 2002 (15 persons)
- CTA/IICA/CARDI Regional workshop: Strengthening the resource mobilization and project development capacity of regional networks 9–14 December 2002 (40 persons).



Group attending Seminar on Presentation Tips for Networks and Researchers, Scarborough, Tobago



Regional workshop: Strengthening the resource mobilisation and project development capacity of regional networks

Agribusiness

- The Agribusiness Unit: Vision 2002 and Beyond

Enterprise Development Through Accelerated Technology Transfer and Adoption

Three strategies characterise the Agribusiness Unit's vision for accelerated enterprise development; firstly the offer of strategic technology products and services to agribusiness enterprises; secondly collaboration in the mobilisation of resources on their behalf to meet the cost of technology transfer and adoption; thirdly the promotion of an investment culture for sustainable commercial growth and viability.

Doubtless, over the years, a myriad of technology products and services was produced by CARDI with the support of its stakeholders and collaborators, and much has been said about the prohibitive cost of its adoption facing agribusiness enterprises. It is for this reason that during the year 2002, as part of the overall process of accelerated enterprise development, the Institute, through its Agribusiness Unit strategically focused on the mobilisation of resources needed to facilitate the process of technology adoption by regional agribusiness enterprises.

In this regard, CARDI successfully mobilised financial resources amounting to some EC\$410,000 through the Cariforum Agricultural Research and Training Fund (CARTF) in support of technology adoption by a number of regional agribusiness enterprises.

A total of 34 new projects was identified for funding under the Caribbean Agricultural Research and Training Fund (CARTF). Of these, 12 were completed and 22 were at varying stages of completion. During the year nine projects valued at approximately EC\$460,000 were implemented and are currently in progress.

Additionally as part of the ongoing process of enterprise development an additional EC\$60,000 was mobilised through public and private enterprise subscriptions in the pursuit of industry and enterprise investment initiatives.

Marketing

- Priority Commodities under the RTP
 - Marketing Studies
 - Collaborative Projects

Priority commodities under the Regional Transformation Programme

The Marketing Unit engaged in a number of studies on the priority commodities sweet potato, hot pepper and small ruminants, in keeping with the Institute's mandate for market development, under the Regional Transformation Programme (RTP). The aim of the RTP is to co-ordinate the identification and implementation of priority national and regional sub-programmes and projects, for agriculture. CARDI has lead responsibility for market development, along with technology generation, validation and transfer, and support responsibility for agribusiness development. Highlights of activities under the market development programme in 2002, are outlined below.

Marketing Studies

Regional Sweet Potato Consumer Study

Research was completed on studies of the nature and size of the current demand for sweet potato and sweet potato products across seven Caribbean countries namely Antigua and Barbuda, Barbados, Guadeloupe, Jamaica, St Kitts/Nevis, St Vincent and the Grenadines, and Trinidad and Tobago. Results showed that among the seven countries surveyed, Jamaica is the largest producer and exporter of sweet potato, while St Vincent and the Grenadines is the largest producer and exporter in the Windward Islands. Antigua and Trinidad and Tobago are major importers. As shown in Table 10, the results also provided information on some of the more common varieties grown in the countries surveyed.

Table 10. Popular sweet potato varieties produced by farmers surveyed

Country	Sweet potato varieties *
Antigua and Barbuda	Black Rock
Barbados	A26/7
Guadeloupe	Sauvre des pauvres, mise malere
Jamaica	Clarendon, ¼ Million
St Kitts/Nevis	Pumpkin, Sugar root
St Vincent and the Grenadines	'Red Skin'
Trinidad and Tobago	'St Vincent type', 'Local type'

* common names identified by farmers

Regional Hot Pepper Consumer Study

The primary objectives of this study were to assess the demand for fresh hot pepper, hot pepper sauce and jerk seasoning in the consumer and retail segments of regional and extra-regional markets. It was also required to make recommendations for generic-marketing strategies towards ensuring sustained competitiveness of Caribbean products, particularly in extra-regional markets.

Information from this study was combined with the results of an earlier market study for hot pepper and various hot pepper products, on consumer and retail market segments in the USA (New York, Miami, Boston), UK (London), Canada

(Toronto), as well as in Trinidad and Tobago, St Lucia and Jamaica. Information from both studies then formed the basis for discussions at preliminary Focus Group meetings held, in Trinidad and Tobago, St Lucia and Barbados.

In keeping with the industry development strategy, a Commodity Systems Analysis of the hot pepper industry was undertaken in 2001/2. The results of this study facilitated the hosting of final Focus Group meetings, the formation of Industry Committees and the identification of priority projects for the hot pepper industry in the countries involved. The Institute will continue to work with these countries to further address the specific problems identified.

Information for product development

The Technical Centre for Agricultural and Rural Cooperation (CTA) provided funding which allowed the Marketing Unit in CARDI to collect data for an assessment of the major constraints to marketing selected commodities (Table 11). During 2002, in-country surveys were initiated for small ruminants (Barbados and Belize and Trinidad & Tobago), sweet potato (St Kitts/Nevis and St Vincent and the Grenadines), cassava (Guyana and Jamaica) and dasheen (Dominica, Jamaica, St Kitts/Nevis and St Vincent and the Grenadines). The results of these studies are expected to improve the regional information available to support product development, marketing and industry development of priority commodities.

Table 11. Selected Commodity Studies initiated in 2002

Commodity	Countries involved
Small ruminants	Barbados and Trinidad and Tobago
Dasheen	Dominica, Jamaica, St Vincent & the Grenadines
Sweet potato	St Kitts/Nevis and St Vincent & the Grenadines
Cassava	Belize, Guyana and Jamaica

The commodity studies and reports are scheduled from completion in 2003. A regional meeting will be held where stakeholders will have an opportunity to review the final results of all the studies initiated in 2002, so that they can make recommendations for industry development on the basis of the findings. A major output of this exercise will be the production of country reports for each of the above-mentioned commodities, outlining models that may be used for the achievement of competitiveness. The results from all these studies will contribute to the preparation of Industry Development Plans designed to result in a more competitive and profitable industry for all the stakeholders along the commodity chain (producers, marketers, processors, and exporters).

Assessment of Miami Hot Pepper Market

Hot pepper is one of the main Caribbean products exported to the Miami market. A visit to Miami was undertaken in 2002 in order to obtain first hand information on the problems importers experience with Caribbean products, and also to establish stronger marketing linkages. Common problems identified by Miami importers included the following:

- inability of many regional exporters to satisfy orders for hot pepper
- inconsistent quality produce
- limited range of produce
- non-competitive prices

The Marketing Unit will continue to work with the other departments within CARDI as well as stakeholders to address these issues.

Collaborative Projects

The Marketing Unit in collaboration with the Agribusiness Unit initiated work on the Montserrat Cassava Development Project and the Agricultural Society of Trinidad & Tobago Hot Pepper and Pumpkin Stabilisation Project. Work on these projects will be completed and reported on in 2003.

Selected Publications

Scientific and refereed publications:

- Asiedu F H, Fearon A L and Seaton J M. 2002. Characterisation of feeding systems of goat farmers in the central region of Jamaica. *CARDI Review* 1, 4–15
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- Final Report—Walker's Wood Sustainable Agricultural Practices Project, 8 May 2001–31 January 2002. Sponsored by USAID. CARDI Jamaica Unit.

Finance

- Financial Report
- Auditor's Report
- Balance Sheet
- Statement of Operations
- Statement of Accumulated Fund
- Statement of Cash Flows
- Notes to Financial Statements
- Office and General Administration

Financial Report

2001

The Accounting department continued its management of the Institute's funds, providing financial assistance and training to internal as well as some external clients.

Staffed by six persons, the department is diverse in personalities, which seems to promote the obvious comradery as well as some keenly contested but amicably resolved issues. This past year saw the continued successful efforts by several staff members to upgrade their skills in the areas of finance, management and internal auditing.

The Accounts team also prepared the accounts for the Caribbean Agribusiness Association for the years 1998, 1999, 2000 and 2001. Above all the team put together the pieces of the financial picture, the highlights of which are provided hereunder.

CARDI's 2001 financial statements must be interpreted in light of some accounting policy adjustments, which affect comparability. These adjustments, aimed at correcting some anomalies had a significant impact, resulting in the net deficit of EC\$6.6 million. as reported.

Firstly, it was necessary to make a provision for bad debt of EC\$5.2 million on outstanding contributions by a member country, since there were concerns as to its recoverability. The length of time the receivable had been outstanding and the uncertainty of a final resolution necessitated the accounting adjustment. The amount provided for represented 83% of the funds receivable from the member. The impact was therefore to increase the deficit by EC\$5.2 million.

Secondly, the previous accounting policy of not depreciating fixed assets contravened accounting convention and had to be adjusted. The aim was to write down fixed assets to its estimated recoverable amount in three years, as a single adjustment would significantly distort the results. The impact of this adjustment was to increase the deficit by EC\$1.8 million.

Taking the above adjustments into consideration therefore, 2001 resulted in a breakeven situation. This is not surprising, as expenses were closely matched to revenues during the year. Pruning of the Institute was evident in preparation of what was a year of uncertainty.

Budgeted government revenue was EC \$7.75 million for the year 2001, actual collections were EC\$6.44 million. The effect was to increase arrears of government contributions by 17% from EC\$ 7.8 million at 31 December 2000 to EC\$ 9.1 million at 31 December 2001.

Donor revenue condensed from EC\$ 2.6 million in 2000 to EC\$ 2.0 million in 2001 with the CDB (EC\$ 0.2 million), CTA (EC\$ 0.7 million) and Coffee Industry Board–Jamaica (EC\$ 0.3 million) being the major contributors, accounting for 60% of total donor revenue. CARDI's programmes also received support from other customary donor, details of which are in the notes to the financial statements.

Examination of the balance sheet would reveal the effects of the depreciation policy on fixed assets and the estimated recoverable amounts on receivables as highlighted above. Current liabilities, with the exception of the overdraft, have been stable and turning over. The pressure of financing activities in the light of revenue shortfalls has resulted in increased average overdraft balances and the commensurate costs.

The outlook for 2002 is further cost containment in what appears to be ever shrinking revenue streams (Core and Donor). Consolidation and retooling to effectively deliver on projects remains the means of maintaining/attracting donor funds. It also remains the main medium through which the Institute could inspire Government confidence in the relevance of CARDI.



Chartered Accountants

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**To the Members of
The Governing Body
Caribbean Agricultural Research and Development Institute**

We have examined the balance sheet of Caribbean Agricultural Research and Development Institute (the Institute) as at December 31, 2001 and the statements of operations and accumulated fund for the year then ended. These financial statements are the responsibility of the Institute's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with International Standards on Auditing. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material mis-statement. An audit includes examining, on a test basis evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by the company, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, the financial statements present fairly, in all material respects, the financial position of the Institute as at December 31, 2001 and the results of its operations for the year then ended in accordance with International Accounting Standards.

A handwritten signature in black ink that reads 'KPMG'.

Chartered Accountants

Port of Spain
Trinidad, W.I.
October 8, 2002

Balance Sheet

December 31, 2001

	Note	<u>2001</u>	<u>2000</u>
Fixed assets	7	\$ 10,918,176	12,757,502
Current assets			
Cash	4a	1,333,074	1,777,963
Fixed deposits	4b	530,189	473,618
Accounts receivable:			
Member governments		3,783,243	7,786,547
Other		184,416	602,598
Projects		1,632	1,439
Prepaid expenses		<u>11,537</u>	<u>57,613</u>
		<u>5,844,091</u>	<u>10,699,778</u>
Current liabilities			
Current portion of long-term liabilities	5	96,350	86,895
Bank overdrafts	4c	411,259	203,284
Accounts payable and accrued liabilities		587,055	648,365
Due to The University of the West Indies		279,129	355,964
Provision for pension costs		242,543	604,677
Due to employees		728,238	568,108
Deferred revenue		<u>16,891</u>	<u>135,125</u>
		<u>2,361,465</u>	<u>2,602,418</u>
Net current assets		<u>3,482,626</u>	<u>8,097,360</u>
Net long-term liabilities	5	<u>143,090</u>	<u>49,440</u>
Net assets	\$	<u>14,257,712</u>	<u>20,805,422</u>
Represented by:			
Accumulated fund	\$	<u>14,257,712</u>	<u>20,805,422</u>

See accompanying notes to financial statements

Approved on behalf of the Board

 Director
  Director

Statement of Operations

For the year ended December 31, 2001

		<u>TOTAL</u>	
	<u>Note</u>	<u>2001</u>	<u>2000</u>
Revenue			
Government contributions:			
Annual core budget	\$	7,752,362	8,800,000
New member		202,687	202,687
Non-government contributions:			
Major Donors	6a	238,820	623,502
Co-operative Programmes/Technical Assistance	6b	1,607,461	1,781,134
Consultancies		330,688	142,058
Produce sales		229,490	239,708
Interest income		102,766	118,579
Miscellaneous		<u>417,116</u>	<u>480,941</u>
Total revenue		<u>10,881,390</u>	<u>12,388,609</u>
Expenditure			
Personnel - professional		3,270,871	3,676,196
Personnel - support		2,552,342	2,550,531
Casual labour		752,264	845,981
Office and general administration (Schedule 1)		1,893,359	1,827,485
Official local travel		37,746	48,060
Official foreign and regional travel		205,027	374,537
Motor vehicle costs		261,338	347,531
Work programme activity		445,241	281,762
Field station and laboratory		198,174	233,367
Training and workshops		629,823	581,353
Board meetings		61,629	199,015
Depreciation		1,751,283	-
Loss on disposal of fixed assets		139,164	30,821
Provision for bad and doubtful debts		<u>5,221,970</u>	<u>-</u>
Total expenditure		<u>17,420,231</u>	<u>10,996,639</u>
Net excess of (expenditure over evenue) revenue over expenditure	\$	(6,638,841)	1,391,970

See accompanying notes to financial statements.

<u>CORE</u>		<u>PROJECTS</u>	
<u>2001</u>	<u>2000</u>	<u>2001</u>	<u>2000</u>
7,752,362	8,800,000	-	-
202,687	202,687	-	-
-	-	238,820	623,502
116,367	99,457	1,491,094	1,681,677
93,680	82,291	237,008	59,767
216,008	225,197	13,482	14,511
102,023	106,424	743	12,155
<u>405,281</u>	<u>286,557</u>	<u>11,835</u>	<u>194,384</u>
<u>8,888,408</u>	<u>9,802,613</u>	<u>1,992,982</u>	<u>2,585,996</u>
3,173,466	3,455,822	97,405	220,374
2,324,690	2,378,903	227,652	171,628
659,611	612,992	92,653	232,989
1,424,576	1,279,794	468,783	547,691
31,103	36,094	6,643	11,966
147,931	123,420	57,095	251,117
242,838	315,148	18,501	32,383
216,601	238,498	228,640	43,264
152,053	203,947	46,121	29,420
210,114	76,144	419,709	505,209
58,699	189,544	2,930	9,471
1,751,283	-	-	-
139,164	30,821	-	-
5,221,970	-	-	-
<u>15,754,099</u>	<u>8,941,127</u>	<u>1,666,132</u>	<u>2,055,512</u>
<u>(6,865,691)</u>	<u>861,486</u>	<u>326,850</u>	<u>530,484</u>

Statement of Accumulated Fund

December 31, 2001

	<u>2001</u>	<u>2000</u>
Accumulated fund - beginning of the year	\$ 20,805,422	19,394,620
Foreign currency translation differences	(8,869)	18,832
Net excess of revenue over expenditure	<u>(6,538,841)</u>	<u>1,391,970</u>
Accumulated fund - end of the year	<u>\$ 14,257,712</u>	<u>20,805,422</u>

See accompanying notes to financial statements

Statement of Cash Flows

December 31, 2001

	<u>2001</u>	<u>2000</u>
Cash flows from operating activities		
Net excess of (expenditure over revenue)		
revenue over expenditure	(6,538,841)	1,391,970
Adjustments to reconcile net excess of revenue over expenditure to net cash from (used in) operating activities		
Unrealised foreign currency translation differences	(8,899)	18,832
Depreciation	1,751,283	-
Loss on disposal of fixed assets	139,164	30,821
Changes in current assets/current liabilities		
Decrease in accounts receivable	4,421,023	481,673
Decrease (increase) in prepaid expenses	46,076	(37,424)
Decrease in accounts payable and accrued liabilities	(61,310)	(350,055)
(Decrease) increase in due to the University of the West Indies	(76,835)	50,510
Decrease in provision for pension costs	(362,134)	(2,463)
Decrease in due to employees	160,130	(245,127)
Increase in deferred revenue	<u>(118,234)</u>	-
Net cash from (used in) operating activities	<u>(628,277)</u>	<u>1,338,736</u>
Cash flows from investing activities		
Purchase of fixed assets	(122,183)	(453,437)
Proceeds from disposal of fixed assets	<u>71,062</u>	<u>47,217</u>
Net cash used in investing activities	<u>(51,121)</u>	<u>(406,220)</u>
Cash flows from (used in) financing activities		
Proceeds of long-term borrowings	219,850	80,703
Repayment of long-term borrowings	<u>(116,745)</u>	<u>(575,340)</u>
Net cash from (used in) financing activities	<u>103,105</u>	<u>(494,637)</u>
Net (decrease) increase in cash and cash equivalents	(596,293)	437,879
Cash and cash equivalents at beginning of the year	<u>2,048,297</u>	<u>1,610,418</u>
Cash and cash equivalents at end of the year	\$ <u>1,452,004</u>	<u>2,048,297</u>
Cash and cash equivalents represented by:		
Bank overdraft	\$ (411,259)	(203,284)
Cash at bank and in hand	1,333,074	1,777,963
Fixed deposit	<u>530,189</u>	<u>473,618</u>
	\$ <u>1,452,004</u>	<u>2,048,297</u>

See accompanying notes to financial statements

Notes to Financial Statements

December 31, 2001

1. Principal activity

Caribbean Agricultural Research and Development Institute (the Institute) is an autonomous organisation serving the states of the Caribbean Community (CARICOM). The member states are Antigua/Barbuda, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Montserrat, St. Kitts – Nevis, St. Lucia, St. Vincent and the Grenadines and Trinidad and Tobago. The Institute also provides services to the British Virgin Island.

The Institute's main objective is to contribute to agricultural development through the generation and dissemination of appropriate technology for the benefit of CARICOM.

2. Reporting currency

These financial statements are expressed in the currency of the Eastern Caribbean Currency Authority (EC).

3. Summary of significant accounting principles

(a) *Statement of compliance*

These financial statements have been prepared in accordance with the International Accounting Standards issued by the International Standards Board.

(b) *Basis of preparation*

These financial statements have been prepared under the historical cost convention, except for the revaluation of certain fixed assets.

(c) *Fixed assets*

Fixed assets are stated at cost except for certain fixed assets situated in the Leeward and Windward Islands with a value of \$481,000 based on professional valuations as at August 31, 1988. Subsequent additions and all other assets are stated at cost. Depreciation is calculated on the straight line basis at the following rate designed to write off the assets over their estimated useful lives.

Leasehold properties (period of lease)	3.33%
Buildings	5.00%
Equipment	15%
Motor vehicles	25%

(d) *Foreign currency translation*

Where the reporting currency of countries, in which some of the Institute's operations are located, is not in EC dollars then the assets and liabilities are translated into EC dollars at the rates of exchange in effect at year-end, and revenue and expenses are translated at average rates. Gains and losses resulting from translation are recorded in the Accumulated Fund.

Transactions in foreign currencies are recorded at the approximate rate of exchange prevailing on the date of the transaction. Gains and losses resulting from foreign currency transactions are recorded in the statement of operations.

Notes to Financial Statements (*continued*)*(e) Revenue recognition*

Government subventions are reported as receivable when awarded. The revenue is recognised as core income in the designated period, which is normally the expected payment date. To the extent these have not been collected, they are reflected in Accounts receivable.

The contributions from external donor agencies for projects are recorded as revenue upon receipt of funds. Undisbursed funds held in project holding bank accounts at year-end are recognised as deferred revenue to the extent that they relate to projects not yet started or where they exceed budgeted expenditure.

4a. Cash

Cash consists of:

	<u>2001</u>	<u>2000</u>
Core:		
Current Accounts	\$ 321,938	921,957
Savings Accounts	260,571	411,206
Petty Cash	5,084	6,435
Cash in Transit	<u>43,980</u>	<u>11,052</u>
	<u>631,573</u>	<u>1,350,650</u>
Projects:		
Current Accounts	339,654	22,263
Savings Accounts	<u>361,847</u>	<u>405,050</u>
	<u>701,501</u>	<u>427,313</u>
	\$ <u>1,333,074</u>	<u>1,777,963</u>

b. Fixed deposits

Fixed deposits consist of:

	<u>2001</u>	<u>2000</u>
Core deposits	\$ <u>530,189</u>	<u>473,618</u>

c. Bank overdrafts

Bank overdrafts consist of:

	<u>2001</u>	<u>2000</u>
Core accounts	\$ <u>411,259</u>	<u>203,284</u>

The bank overdraft is secured by a lien over fixed deposit of \$439,734 at Republic Bank Limited in Trinidad and Tobago.

Notes to Financial Statements (*continued*)

5. Net Long-term liabilities

Net long-term liabilities consist of:

	<u>2001</u>	<u>2000</u>
a) Due to The Board of Inland Revenue (Trinidad and Tobago)	\$ -	22,736
b) (i) Republic Bank Limited (Trinidad & Tobago)	189,383	-
(ii) Republic Bank Limited (Trinidad & Tobago)	27,484	39,763
c) Barclays Bank Plc (Belize)	-	5,570
d) National Commercial Bank (St Vincent)	-	10,644
e) Barclays Bank Plc (St Lucia)	22,573	38,508
f) Citizen Bank Guyana Inc. (Guyana)	-	<u>19,114</u>
	239,440	136,335
Less current portion thereof	<u>(96,350)</u>	<u>(86,895)</u>
Net long-term liabilities	\$ <u>143,090</u>	<u>49,440</u>

- a) The amount owing to the Board of Inland Revenue is non-interest bearing and is being repaid directly by the Ministry of Agriculture (Trinidad and Tobago) in monthly installments of \$23,159.
- b) (i) The amount owing to Republic Bank Limited was repaid over thirty-six (36) monthly installments of \$7,701 inclusive of interest of 15.75% per annum which commenced July of 2001
- (ii) The amount owing to Republic Bank Limited is being repaid over sixty (60) monthly installments of \$1,612, inclusive of interest of 17.27% per annum which commenced February 1999. The loan is secured by a mortgage bill of sale over a motor vehicle.
- c) This amount owing to Barclays Plc is being repaid over thirty-six monthly installments of \$1,451, inclusive of interest of 10% per annum which commenced on May 1998. This loan is secured by a bill of sale over a tractor registered and stamped to cover \$40,150.
- d) The amount owing to National Commercial Bank – St Vincent is being repaid over forty-eight monthly installments of \$1,090, inclusive of interest at a rate of 14% per annum which commenced on October 1997. The loan is secured by a mortgage bill of sale over a motor vehicle.

Notes to Financial Statements (*Continued*)

5. Net Long-term liabilities (continued)

Long-term liabilities consist of:

- e) The amount owing to Barclays Bank Plc (St Lucia) is being repaid over thirty-six (36) monthly installment of \$1,627, inclusive of interest. The current rate of interest is 13.67% per annum which commenced May 2000. The loan is secured by a mortgage bill of sale over a motor vehicle.
- f) The amounts owing to Citizen Bank of Guyana (Inc.) was repaid over twelve (12) monthly installments of \$2,976 inclusive of interest of 15% per annum. This loan is unsecured.

6. Non-Government contributions

Non-Government contributions consist of:

	<u>2001</u>	<u>2000</u>
a. <i>Major Donors</i>		
IICA	\$ 238,820	406,783
IDB	-	67,563
CIDA International	-	94,793
EDF Lome III	-	<u>54,363</u>
	<u>\$ 238,820</u>	<u>623,502</u>
b. <i>Co-operative Programmes/Technical Assistance</i>		
CRSP – IPM	\$ 117,994	212,283
CTA Workshops	282,778	471,627
CTA Regional Branch Office	\$ 486,169	296,433
ISNAR Workshops	-	12,562
CDB	174,465	136,548
Coffee Industry Board - Jamaica	252,698	217,895
CFC	-	291,817
Ministry of Agriculture–Jamaica	116,367	-
Aluminium Partners–Jamaica	112,093	-
Other	<u>64,897</u>	<u>141,969</u>
	<u>\$ 1,607,461</u>	<u>1,781,134</u>

Notes to Financial Statements (*Continued*)

7. Net fixed assets

	Leasehold Properties	Buildings	Equipment	Motor Vehicles	Livestock	Total
Balance -						
January 1, 2001	627,892	2,667,095	7,092,086	2,251,900	118,529	12,757,502
Additions	-	5,370	116,813	-	-	122,183
Disposals	-	-	49,972	160,254	-	210,226
Balance -						
December 31, 2001	627,892	2,72,465	7,158,927	2,091,646	118,529	12,669,459
Depreciation						
Charge for the year	20,909	133,623	1,073,839	522,912	-	1,751,283
Carrying Value						
Balance -						
December 31, 2000	627,892	2,667,095	7,092,086	2,251,900	118,529	12,757,502
Balance -						
December 31, 2001	606,983	2,538,842	6,085,088	1,568,735	118,529	10,918,176

8. Accounts Receivable - Member Governments

Accounts Receivable - Member Governments is stated net of provision for bad and doubtful debts. The debt owed by the Government of Guyana is fully provided for at year-end due to its longstanding nature. The total liability for the Guyana Government as at the balance sheet date is EC\$6,269,610. However, the institute is negotiating with the Guyana Government on settlement of this debt.

9. Financial Instruments

A financial instrument is any contract that gives rise to both a financial asset and a financial liability or equity instrument of another enterprise. For the purpose of these financial statements, financial assets have been determined to include cash and accounts receivable. Financial liabilities have been determined to include interest bearing loans and borrowings and accounts payable and accrued liabilities.

The Institute has exposure to credit and foreign currency risk which arises through the normal course of its business. Derivative financial instruments are not presently used to reduce exposure to fluctuations in these risks.

Notes to Financial Statements (*continued*)

9. Financial Instruments (*continued*)

Credit risk

Management has a credit policy in place and exposure to credit risk is monitored on an on-going basis. The Institute does not require collateral in respect of financial assets. At balance sheet date there was no significant concentration of credit risk. The maximum exposure to credit risk is represented by the carrying amount of the financial asset in the balance sheet.

Foreign currency risk

The Institute incurs foreign currency risk on transactions that are denominated in a currency other than the Eastern Caribbean Currency Authority (ECCA) dollar. There were no material unrecognised gains or losses during or at the end of the financial year.

Interest rate risk

Interest rate risk is the risk that the value of a financial instrument will fluctuate due to changes in the market interest rate. Interest rate risk is affected where there is a mismatch between interest earning assets and interest bearing liabilities, which are subject to interest rate adjustments within a specific period. The Institute debt is predominately short-term and related to working capital movements. No interest rate hedging is currently undertaken.

10. PAYE and Health Surcharge

As at year-end, there is an amount of \$239,178 (2000 - \$213,250) of unpaid PAYE and Health Surcharge. In accordance with Section 99(4) of the Income Tax Act of Trinidad and Tobago, these unpaid amounts attract a penalty of 100% and interest of 15% per annum from 1996. These have not been reflected in the Accounts.

11. Contingencies

The United States of America Agency for International Development has issued a bill for collection on July 30, 1996 for the amount of (EC\$2,310,518) US\$859,504 in respect of the West Indies Tropical Produce Support Project for the period July 1, 1991 to December 31, 1994. This was as a result of the sub-grant to Caribbean Agricultural Trading Company since accounting records were not available for audit. The bill of collection was issued to both the Institute and the Organisation of Eastern Caribbean States, since they were jointly and severally liable for the funds.

Office and General Administration

Schedule 1

For the year ended December 31, 2001

	<u>2001</u>	<u>2000</u>
Bank interest charges	\$ 81,506	130,565
Insurance	32,290	61,835
Computer supplies	74,553	31,239
Rental and repairs		
- Office equipment	24,444	44,193
- Building	132,544	163,033
Utilities	247,167	266,987
Legal and professional	675,396	748,427
Other office administration cost	256,634	238,117
Communication services	18,404	67,928
Information services	11,111	75,161
Write off of unidentified balances	339,310	-
	\$ 1,893,359	1,827,485

Human Resource

- Administration

The year 2002 saw many staff changes including the appointment in November of a new Human Resource Manager. In September, Pathleen Titus, CARDI Representative, Tobago was transferred to St Vincent and the Grenadines while Ronald Pilgrim, CARDI Representative, was transferred from Dominica to St Lucia in November.

The Board of Directors approved the Performance Management System initiated by the former Human Resource Manager and, in the latter part of the year, the new Human Resource Manager revised the forms. Training of managers is scheduled for 25 February 2003. The Human Resource Manager will also facilitate a Team Building workshop scheduled for the 18 and 19 February 2003. This workshop will be carried out initially at Headquarters and then in the Country Units.

The Executive Director (Ag), standing in during the absence of a Human Resource Manager, negotiated with the Unions/Staff Associations of the Institute salary packages for the period 1999 to 2001. A number of country units, as well as the CARDI Professional Staff Association (CPSA), arrived at a settlement and new salaries were implemented in November 2002 while work was initiated with Finance to prepare liability statements for all staff. This exercise is due for completion in 2003.

The Human Resource Unit continued to administer and improve various incentive packages for the Institute.

Directorate and Personnel

Board of Governors

Honourable Anthony Wood	Chairman, Barbados
Honourable Vere C Bird (Jr)	Antigua and Barbuda
Honourable Daniel Silva,	Belize
Honourable Vince Henderson	Dominica
Honourable Claris Charles,	Grenada
Honourable Reepu Persaud	Guyana
Honourable Roger Clarke	Jamaica
Honourable Margaret Dyer-Howe	Montserrat
Honourable Cedric Liburd	St Kitts/Nevis
Honourable Calixte George	St Lucia
Honourable Selmon Walters	St Vincent & the Grenadines
Honourable John Rahael	Trinidad & Tobago

Board of Directors

Dr Keith Archibald	Chairman
Mr Hollis Henry	Antigua & Barbuda (for Leeward Islands)
Mr Carston Simmons	Barbados
Mr Sergio Garcia	Belize
Mr Dindylal Permaul	Guyana
Dr Richard Harrison	Jamaica
Mr Raymond Austrie	Dominica (for Windward Islands)
Mr Winston Gibson	Trinidad and Tobago (<i>until Sept. 2002</i>)
Dr JohnPegus	Trinidad and Tobago (<i>from Oct. 2002</i>)
Ms Desiree Field-Ridley	CARICOM Secretariat
Mrs Donna Morrison	University of Guyana
Prof. Charles McDavid	The University of the West Indies
Mr Lionel James	Caribbean Development Bank
Dr Compton Paul	Executive Director, Ag (<i>until April 2002</i>)
Mr Bruce Lauckner	Executive Director, Ag (<i>from May 2002</i>)
Alternate members:	
Mrs Arlene Buckmire-Outram	Grenada (for Windward Islands)
Ms Ann Marie Dewar	Montserrat (for Leeward Islands)
Observers:	
Mr Raphael Archibald	St Kitts/Nevis
Mr Simeon Greene	St Vincent & the Grenadines
Dr James Fletcher	St Lucia

Observers (*continued*)

Dr H.A.D. Chesney	Inter American Institute for Cooperation on Agriculture (<i>until July 2002</i>)
Mr Aaron Parke	Inter American Institute for Cooperation on Agriculture (<i>from June 2002</i>)
Mr David Bowen	United Nations Food and Agriculture Organisation
Dr Carl B Greenidge	Technical Centre for Cooperation on Agriculture and Rural Development (CTA)

Senior Management Team

Lauckner, Bruce. BSc	Executive Director Ag.
deFreitas, Claudette. MLIS	Information Resources Manager
Gibson, Norman. MPhil	Manager, Research and Development
Iton, Ardon. PhD	Head, Marketing Unit
Marcus, Gemma. EMBA	Head, Human Resource Unit (<i>to April 2002</i>)
Nero, Curtis. ACCA	Accountant
Pilgrim, Valarie. MBA	Corporate Planner
Rampersad-Fook, Margaret. MSc	Human Resource Manager (<i>from Nov. 2002</i>)
Wilson, Maurice. MSc	Agribusiness Development Specialist

Professional Staff

Adams, Herman. MSc	Plant Breeder, CTL	Barbados
Andall, Reginald. MSc	Technology Transfer	Grenada
Asiedu, Francis. PhD	Animal Science	Jamaica
Clarke-Harris, Dionne. MPhil	Entomology	Jamaica
Dalip, Kathy. PhD	Entomology	Jamaica
Fearon, Albert. MSc	Technology Adaptation	Jamaica
Hosein, Azim. MPhil	Technology Adaptation	Guyana
Jones, Frederick. MSc	Plant Pathology	St Lucia
Marcus, Gemma. EMBA	Human Resources	Trinidad and Tobago
McAndrew, Neville. MSc	Agronomy	Belize
Murray, Karl. MSc	Agronomy	Tobago (<i>from Sep. 2002</i>)
Paulraj, Litta. PhD	Tissue Culture	Barbados
Pilgrim, Ronald. MSc	Postharvest Technology	Dominica (<i>until Oct. 2002</i>)
		St Lucia (<i>from Nov. 2002</i>)
Petersen, Joan. BSc	Agronomy	Trinidad and Tobago
Rhodes, Llewellyn. MPhil	Entomology	St Kitts/Nevis
Robin, Gregory. MPhil	Agronomy/CR	Dominica
Ross, Julius. MSc	Horticulture/CR	Antigua and Barbuda
Scantlebury, Collin. MSc	Tissue Culture	Barbados
Simpson, Leslie. PhD	Soil Science	Jamaica
Sinha, Anil. MSc	Agronomy/CR	Belize
Titus, Pathleen. MPhil	Agronomy	Tobago (<i>until Aug. 2002</i>)
		St Vincent and the Grenadines (<i>from. Sep. 2002</i>)

Technical Staff

Antigua

Adams, Sylvester	Field Assistant
Batchelor, Delvin	Technical Assistant
Browne, Bradbury	Field Assistant
Henry, Angela	Administrative Assistant

Barbados

Forde, Morreen	Secretary
Niles, Marcia	Administrative Assistant
Pollard, Ashton	Senior Laboratory Assistant
Sisnett, Derek	Laboratory Assistant (<i>until Sept. 2002</i>)
Wood, Barbara	Laboratory Assistant
Worrell, Ferdinand	Field Assistant

Belize

Alpuche, Rosita	Administrative Assistant
Garcia, Angel	Watchman
Lindo, Martin	Technician

Dominica

Corriette, Lucille	Administrative Assistant
Etienne, Dorian	Technician
James, Suzanne	Technician
Thomas, Jacob	Field Assistant

Grenada

Bruno, Janelle	Administrative Assistant
Charles, Elton	Technician
Raymond, Reuben	Field Assistant

Jamaica

Allen, Carlton	Research Assistant
Asiedu, Elizabeth	Accounts Clerk
Bailey, Una	Maid/Cleaner
Barnes, Joel	Technical Assistant
Barnes, Ralston	Technical Assistant
Blythe, Adali	Senior Administrative Assistant
Hanson, Norman	Farm Supervisor
Jones, Desmond	Technical Assistant
Matherson, Sandra	Receptionist
Maxwell, Ervin	Agricultural Labourer
McDonald, Lloyd	Expeditor/Driver
Morris, Erna	Accounting Assistant
Pitterson, Patrick	Research Assistant
Robinson, Kenrick	Technical Assistant
Samuels, Paul	Technical Assistant
Simpson, Donald	Technical Assistant
Trought, Anthony	Research Assistant
Webb, Francine	Research Assistant
Wizzart, Archibald	Accounts Clerk

Monterrat

Murraine, Robert Technician

St Kitts

Browne, Roderick Field Assistant
 Farier, Austin Senior Technician
 Hamilton, Sharon Administrative Assistant

St Lucia

Auguste, Gabriel E. Field Assistant
 Frederick, Sylvester Field Station Supervisor
 Myers, Peter Technician (*until Nov. 2002*)
 O'Brien Sharon Administrative Assistant

St Vincent and the Grenadines

deFreitas, Jacqueline Administrative Assistant
 Sampson, Lenford Technician

Trinidad and Tobago Unit

Michelle John Research Assistant
 Leith, Hendrickson Administrative Assistant
 Quashie, Selby Technician

Headquarters

Abraham-King, Shelley Accounting Assistant
 Baptiste, Marva Accounting Assistant
 Basdeo, Krishna Messenger/Driver
 Bassant, Ramsaran Office Assistant/Driver
 Belgrove, Kelly Research Assistant
 Bleasdell, Maguerita Administrative Secretary (*until Dec. 2002*)
 Butler, Sharmin Kitchen Attendant
 Brathwaite, Laticher Information Assistant
 Calliste, Jean Telephone Operator
 Chase, Beverly Research Assistant (*from June 2002*)
 Christo, Trevor Production Assistant
 Cruickshank, Karel Personnel Clerk (*from May 2002*)
 Dookie-Hamil, Rajdaye Accounts Clerk
 Dubarry, Candice Supervisor, Printing Services
 Gittens, Kathleen Senior Administrative Secretary (*until Nov. 2002*)
 Jones, Marcus Statistical Assistant
 Kalloo, Leslie-Anne Senior Accounting Assistant
 Khan, Prematie Accounts Clerk
 Maharaj, Debra Executive Assistant
 Muller, Pauline Information Assistant
 Rambada, Shamela Graduate Assistant
 Redhead, Margaret Administrative Secretary
 Roach, Keith Production Assistant
 Samaroo, Allan Network Analyst
 Samsouandar, Jaiwantie Research Assistant
 Simmons, Jasmin Information Assistant
 Sieunarine, Simon Accounting Supervisor
 Williams-Pierre, Cherry Ann Research Assistant (*from July 2002*)
 Wilson, Hazel Senior Administrative Secretary

Contact Information

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Country Units

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