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**REPORT OF THE CARIBBEAN AGRICULTURAL RESEARCH AND
DEVELOPMENT INSTITUTE (CARDI) 2003-2004**

Guayaquil, Ecuador

BIENNIAL REPORT

ON THE ACTIVITIES OF THE CARIBBEAN AGRICULTURAL RESEARCH AND DEVELOPMENT INSTITUTE

**CARDI
2003 – 2004**



Improving lives through Agricultural Research

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BIENNIAL REPORT ON THE ACTIVITIES OF THE CARIBBEAN AGRICULTURAL RESEARCH AND DEVELOPMENT INSTITUTE 2003-2004

1.0 Introduction

This report covers the final two years of the third decade of CARDI which celebrates its 30th Anniversary during 2005.

During the period the CARICOM Heads of Government approved a new contribution formula for core payments to CARDI. This new contribution formula calls upon the larger member states (e.g., Jamaica, Trinidad and Tobago) to pay a smaller percentage of the core budget and for the smaller member states (e.g., the members of the Organisation of Eastern Caribbean States, OECS) to pay a larger percentage. However the overall budget amount is limited and restrictive, so it is clear that increased activities (and even maintenance of some current activities) will depend on the Institute's success in attracting donor funds both project based and unrestricted.

The agreement on a new contribution formula was accompanied by a strong signal of support from the CARDI member states and this led to the Board of Directors actively searching for a substantive Executive Director. Since the resignation of the last substantive Executive Director effective July 2000, there was some uncertainty as to the future of CARDI and there were two acting Executive Directors, Dr. Compton Paul (August 2000-April 2002) and Mr. Bruce Lauckner (May 2002-December 2003). These acting Executive Directors assisted the CARDI Board of Directors and the CARDI Board of Governors (who comprise the Ministers of Agriculture of the 12 member states) in advising the Heads of Government that research and development in agriculture is not only desirable but necessary; and also in reiterating a regional approach in the situations where there are common problems and common solutions.

In January 2004, the new substantive Executive Director, Dr. Wendel Parham of Belize took up office. Dr. Parham found that CARDI, because of uncertainties and limited budget, had not always participated in important deliberations that had implications for agricultural research and development and has the challenge to regain ground and to rebuild alliances in the research and development arena.

The CARICOM Regional Transformation Programme (RTP) for Agriculture was launched in 1996 and CARDI had implemented strong programmes for the RTP lead commodities of hot pepper (*Capsicum chinense* Jacq.), sweet potato (*Ipomoea batatas* L.) and small ruminants. CARDI had also taken on its mandate under the RTP for Market Development and launched the CAMID network to set up market intelligence networking in the region.

The “Jagdeo Initiative” (Strengthening Agriculture for Sustainable Growth and Development) commissioned by President Bharatt Jagdeo of Guyana, revisits the RTP and proposes interventions to alleviate the key binding constraints to the agricultural sector in CARICOM countries. The new CARDI is now a member of the CARICOM-led core group developing the Jagdeo Initiative.

The CAMID network, which is being strengthened with FAO funding, is now being placed under the management and co-ordination of CARDI to strengthen CARDI’s capacity to deliver its market development mandate under the RTP.

During 2004, CARDI held two strategic planning sessions during which programmes and projects for 2005-2007 were identified. The main programme areas were identified as:

1. Crop production
2. Livestock production
3. Enterprise development
4. Natural resources management
5. Information and communication
6. Corporate services

Sub programmes were developed in all these programmes; for crops and livestock these define the major commodities (hot pepper, sweet potato and small ruminants) which will be worked on during the next triennium.

2.0 Governance and management

2.1 Decisions of CARICOM Heads of Government

As reported in the CARDI 2001/2 Biennial report to this forum, the CARDI Board of Governors met early in January 2003 and recommended to the CARICOM Heads of Government that CARDI be funded with an annual core budget of just under EC\$8 million. In February 2003 the Heads of Government (HOG) reaffirmed the importance of applied research in the required transformation of regional agriculture and agreed to remain current in their contributions and also to make available some arrears of funds owing to the institute.

The issue of funding was deferred to the 24th Annual Meeting of HOG in July 2003 where a new contribution formula (as described in 1.0) was agreed with the total budget as recommended by the Board of Governors. In this July meeting the HOG reaffirmed its support for CARDI as an important pillar in the transformation and development of regional agriculture.

The agreed new contribution formula was implemented on 1 January 2004.

2.2 Strategic partners

2.2.1 University of Florida / Invasive species

CARDI signed a collaborative agreement with the University of Florida (UF) in September 2003. This has already borne fruit and a number of researchers from UF are helping with CARDI research programmes. In addition, this partnership has facilitated the formation of the Caribbean Working Group on Invasive Species. This group comprises representatives from CARDI, UF, IICA, University of the West Indies, FAO and CAB International and by the end of 2004 had completed a number of important activities including:

- ◆ Organising a workshop hosted by CARDI in Port of Spain, Trinidad entitled “Facilitating safer US-Caribbean Trade: invasive species issues”. This workshop was funded by the Caribbean Development Bank, UF, FAO and IICA and was

attended by representatives from the institutes forming the Caribbean Working Group on Invasive Species, by representatives from the funders of the workshop, by representatives of 20 Caribbean countries (English, French and Spanish speaking), by representatives from the US Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) and by a representative from the Global Invasive Species Programme. Among the outputs of the workshop was a resolution on the need to militate against invasive species. CARDI sent this resolution to governments and other agencies in the Caribbean Basin.

- ◆ Drafted a document "Caribbean Region Invasive Species Intervention Strategy (CRISIS)" which is being considered by Caribbean governments.
- ◆ Prepared and encouraged the preparation of project proposals.

The group has been very active in 2005 and this activity will be presented in the 2005/6 biennial report.

2.2.2 Other important partnerships

CARDI has a close working relationship with IICA and a number of joint projects are being executed under the IICA/CARDI Agreement. In addition, IICA funding has facilitated a consultant who is helping CARDI's Executive Director to form a strategic framework for the institute. IICA has also promised technical assistance to streamline the human resource and financial systems of CARDI.

On the direction and initiative of the FAO Director General, CARDI and FAO held a number of meetings in 2004 with a view to developing a programme of co-operation. Areas proposed for strengthening are the Information and Communications Unit and Planning and Projects Unit. Meanwhile, the FAO Caribbean Food Security Programme is underway and CARDI is housing two specialists assigned to the programme. These are specialists in irrigation and trade policy.

Amongst other institutes with which CARDI has joint projects and/or a close working relationships are CAB International, University of the West Indies, Caribbean Development Bank, KIT (the Netherlands Tropical Agriculture Institute), Barbados Sugar Producers Association, ALPART Bauxite Company (Jamaica), Coffee Industry Board (Jamaica) and the Caribbean Industrial Research Institute (CARIRI).

CARDI houses the Caribbean Regional Branch Office of CTA, an European Union-African Caribbean Pacific (EU-ACP) institute headquartered in the Netherlands. CARDI, Jamaica is the Caribbean Centre for the USAID funded global IPM CRSP programme.

2.3 National Co-ordinating Committees for Agricultural Research and Development (NCCARD)

One of the early actions of the new Executive Director was to propose to the 12 member governments of CARDI, the setting up of National Co-ordinating Committees for Agricultural Research and Development (NCCARDS).

Each NCCARD is chaired by the Ministry of Agriculture, usually at the level of the Chief Technical Officer. CARDI is responsible for co-ordination of the NCCARDS. All the agencies involved in agricultural R & D are members of NCCARD. Besides CARDI and the Ministry of Agriculture, typical members are IICA, FAO, Agricultural Development Banks, Universities, Commodity Boards and Private Sector Organisations.

By the end of 2004, NCCARDS were active in Belize, Dominica, Jamaica and St. Vincent and the Grenadines. A similar mechanism had already been set up in St. Lucia and, as there is no desire to duplicate existing bodies, the formal NCCARD is not necessary in St. Lucia. Grenada was on the point of starting NCCARD, but Hurricane Ivan in September 2004 halted most activity in that country so that hurricane relief efforts could be given major focus.

2.4 Changes in governance personnel

At the CARDI Board of Governors meeting held in St. Kitts and Nevis in June 2003, the term of office of Barbados in chairing the Board of Governors came to an end. This chairmanship had been held by Barbados for several years. The meeting in St. Kitts and Nevis, elected St. Lucia to chair for the next three-year period. Thus Senator Calixte George, Minister of Agriculture, Forestry and Fisheries, St. Lucia became chairman of the CARDI Board of Governors. In a St. Lucia cabinet reshuffle in January 2004, Senator Calixte George moved to the portfolio of National Security and Honorable Ignatius Jean became Minister of Agriculture, Forestry and Fisheries, St. Lucia and Chairman, CARDI Board of Governors.

Also in 2003, Dr. Keith Archibald, Chairman of the CARDI Board of Directors came to the end of his three-year term of office. The CARDI Board of Governors agreed that Dr. Archibald should continue as Chairman of the CARDI Board of Directors for a further three-year period 2003-2006.

As already reported, a substantive Executive Director, Dr. Wendel Parham assumed duties on 1 January 2004. The previous acting Executive Director, Mr. Bruce Lauckner served from 1 May 2002 to 31 December 2003.

2.5 Revenue generating / bankable projects

CARDI is working at developing revenue generating/bankable projects to be implemented in member countries to gain revenues to plough back into the research and development activities and to rehabilitate the institute's facilities and installations. The plans are for these projects to get off the ground in 2005.

3.0 Programmes

3.1 Crops

3.1.1 Hot Pepper (Capsicum chinense Jacq.)

CARDI has initiated Caribbean Regional Hot Pepper Varietal Trials in several countries to evaluate production, marketing and processing of fresh fruits from advanced

accessions compared to popular local varieties. The varieties being evaluated are CARDI Green, CARDI Red, Red Congo, Red Flat, Cayenne, Tiger Teeth, West Indies Red and Scotch Bonnet. Some of the first results show that CARDI Green and Red Congo take almost six less days to 50 percent flowering and 10 less days to first harvest when compared with Scotch Bonnet. CARDI Green and Red Congo also had the highest survival rate of the eight varieties from transplanting to harvest (92%). The highest yielder was the Cayenne accession. The initial trials indicate that CARDI Green shows the best potential for commercial production because of high yield and fruit quality characteristics.

The hot pepper industry in Belize is based on the production and marketing of fresh fruit and processed products. The CARDI Belize Unit is involved in the production of hot pepper seeds for sale to local farmers. Breeder seed is acquired from the CARDI plant breeder in Barbados and planted out to produce stock seed; this is given to selected farmers for growing and the resulting berries are used to extract the commercial seed on which the industry depends.

In Barbados, continuous genetic improvement of hot pepper is carried out. This has produced the CARDI Red and CARDI Green lines mentioned in the trials above. Work is also in progress in Barbados and Trinidad and Tobago to stabilise Caribbean landraces. There is also work on recombinant inbred lines developed from crosses between landraces. In these ways CARDI is producing a range of hot pepper types suitable to the changing needs of the market.

3.1.2 Root crops

*3.1.2.1 Sweet potato (*Ipomoea batatas* (L.) Lam.)*

Work in St. Vincent and the Grenadines was done to evaluate selected varieties for market acceptance, yield and resistance/tolerance to pests and diseases. Planting material from 21 varieties of sweet potato was collected and evaluated at the CARDI field station. The most acceptable, based on market demand, were the red skinned, white fleshed varieties 'Black Vine' and 'Big Red'.

Also in St. Vincent and the Grenadines a baseline survey was done for incidence and management practices for the sweet potato grub, *Eucepes* sp. The surveys revealed that the major problem was in fact the grub *Phyllophaga* sp. and not *Eucepes* sp.

In Jamaica and St. Kitts work is also being done to improve sweet potato production for local and export marketing.

3.1.2.2 *Dasheen (Colocasia esculenta (L.) Schott)*

CARDI's research has contributed to the expansion of the dasheen fresh produce trade in the region over the past 10-15 years. However, the industry must diversify towards "value added strategies". In Dominica agro-processing industries are producing dasheen chips, but production had to be stopped because of complaints of acidity (itching). CARDI research investigated the effects of different cultivars, maturity indices and agro-ecological zones on dasheen chip acidity. It was found that 'White' dasheen harvested at 7 months and 'Common' dasheen harvested at 8 months produced the least acrid chips.

The benefits of tissue culture as a method of rapid propagation are well known. In St. Vincent and the Grenadines, CARDI compared production from tissue cultivar plantlets to traditional planting in two different agro-ecological zones. The results of both yield and proximate chemical composition showed no differences between the plants cultivated from traditional corms and those grown from tissue culture. Thus the use of tissue culture plantlets for dasheen production is a viable option which can be commercially exploited.

3.1.2.3 *Yam (Dioscorea spp.)*

In St. Kitts and Nevis, as reported in the 2001/2002 Biennial Report, CARDI has advanced yam production and transferred this to the St. Kitts Sugar Manufacturing Corporation who produces most of the yam in that country. CARDI provides technical support to producers in pest and disease management and advanced crop care practices. In 2004, samples of harvested crops showed a 15% decrease in grub and worm damage as compared to the previous year.

In Dominica, the causes of yam hallowing were investigated and a management strategy for yam anthracnose was being developed.

3.1.2.4 *Cassava (Manihot esculenta Crantz)*

In St. Vincent and the Grenadines, CARDI sourced 29 varieties of cassava from CIAT for germplasm evaluation; but the survival rate of some of these was low.

CARDI, Dominica undertook research to characterise eight indigenous cassava cultivars. The mean total tuber weight per plant ranged from 1.36 kg to 2.26 kg; the cultivar with the highest mean tuber weight per plant was 'Bernard'. 'Cent Livre De/G' had the longest tuber length (26.9 cm).

In Montserrat research is being done to improve cassava production and marketing in order to improve food and nutrition security on that volcano-ravaged island.

3.1.3 *Vegetable and food crops*

In Antigua and Barbuda, agronomists have been working to produce a range of planting materials for the local and regional markets. These include corn (*Zea mays* L.), pumpkin (*Cucurbita maxima* Duch. ex Lam.), table squash (*Cucurbita pepo* L.), hot pepper (*Capsicum chinense* Jacq.) and cotton (*Gossypium barbadense* L.). Seeds produced in 2004 amounted to around 275 kg of corn, 10 kg of pumpkin and a smaller amount of

table squash. CARDI Antigua provided technical assistance to the cotton task force and the area under production doubled from 22 ha in 2003 to 45 ha in 2004.

CARDI, Belize has been doing considerable work in soybean (*Glycine max* (L.) Merrill). Research continued to identify varieties that perform better than CARDI S-15, CARDI S-89, 'Padre' and D 082-2740, the cultivars recommended for commercial production. A new variety acquired from Mexico under the Belize government soybean project produced 1,892 kg/ha in an evaluation trial. This is being further evaluated in different cropping seasons.

Also in Belize, research into pre-emergent herbicide treatments revealed that Lasso[®] performed better than Prowl[®] at maintaining weed free beds. In another experiment to compare the bio-efficacy of four insecticides against army worm (*Spodoptera frugiperda* J.E. Smith) in soybean, it was found that Procron[®] was the most effective treatment.

CARDI, Belize also provided technical assistance to the Belize Bureau of Standards to develop a document entitled "Draft Regional Standards for Red Kidney Beans". In this way, CARDI is facilitating trade between Belize and Jamaica and Trinidad and Tobago, the primary markets for red kidney beans (*Phaseolus vulgaris* L.). Work included research to determine the critical standard characteristics to be met by growers and exporters. Some other legumes on which research work was done in Belize were peanut (*Arachis hypogaea* L.), cowpea (*Vigna unguiculata* (L.) Walp.) and chickpea (*Cicer arietinum* L.).

In St. Vincent and the Grenadines, CARDI and the Ministry of Agriculture evaluated the performance of five sweet pepper (*Capsicum annum* L.) varieties. Highest yields were obtained from "Field Star".

CARDI scientists in Trinidad and Tobago have been working to increase production of a range of vegetables and food crops. To this end, the CARDI managed Goldsborough

Demonstration and Training Centre in Tobago has produced a considerable number of seedlings of hot pepper (*Capsicum chinense* Jacq.), tomato (*Lycopersicon esculentum* Mill.), sweet pepper (*Capsicum annuum*), cabbage (*Brassica oleracea* L subsp. capitata), cauliflower (*Brassica oleracea* subsp. botrytis) and others. In addition to seedling production at Goldsborough, research work is ongoing to identify the best cultivars for local production and to develop techniques for optimal yields.

In the first 8 months of 2004, the production of a range of seeds and seedlings at CARDI, Grenada increased considerably compared to the same period in 2003. More than 350,000 seedlings and other vegetative propagules were produced and distributed to farmers. However, a severe setback occurred in September 2004 when Hurricane Ivan destroyed the seedling nurseries.

In Jamaica, methods to utilise threshold based spray applications were validated on callaloo (*Amaranthus* sp.). Two IPM strategies were tested as follows:

- (1) exclusion of major pests, using a row cover of 70% light transmission, in combination with cultural practices.
- (2) use of new biorational chemistries applied within the framework of a resistance management programme (rotation of chemicals and the use of a threshold-based pesticide application guide developed for lepidoptera species on callaloo) in combination with cultural practices.

The second system was shown to reduce pesticide input in callaloo production and was as effective as farmer practice of weekly sprays (lambda-cyhalothrin).

3.1.4 Tree crops

Work in Trinidad and Tobago to assess the cost of production and productivity characteristics of papaya (*Carica papaya* L.) is providing researchers with the data needed to develop protocols for farmers wishing to access the hospitality sector as a major market.

In St. Kitts and Nevis, CARDI conducted work to determine the natural enemy complex of the papaya mealy bug (*Paracoccus marginata*). A number of natural enemies were observed in the field. Live mealy bugs were collected from host plants, encapsulated in gelatin capsules and examined regularly for one month for emergence of parasitoids.

Adults and larvae of the introduced ladybird beetle (*Cryptolaemus montrouzieri*) were observed as well as the indigenous *Scymnus* spp. If required rearing systems will be developed for outstanding candidates for mass releases.

In St. Lucia, improved technologies for the production of passion fruit (*passiflora edulis* L.) and pineapple (*Ananas comosus* (L.) Merr.) were demonstrated at the CARDI field station to farmers, extension officers and students.

In Dominica research was completed on the effects of planting time and agro-ecological zones on two “Smooth Cayenne” pineapple (*Ananas comosus* (L.) Merr.) cultivars. This research will assist producers to maximise production from the various agro-ecological zones.

Cutting edge technology is being developed and used in Antigua and Barbuda to rapidly propagate breadfruit (*Artocarpus altilis* Park Fosberg). CARDI’s horticulturist has developed rapid propagation methods for a range of crops earmarked by the Government of Antigua and Barbuda for industry development.

The Grenada work on the dwarfing of golden apple (*Spondias cytherea* L.) was severely curtailed by Hurricane Ivan. However, successful crossing was achieved between the tall types and dwarf trees.

Nutmeg (*Myristica fragrans* (Houtt)) is a spice crop of major economic importance to Grenada. However, a disease which causes visible wilting of the leaves and branches of the trees has affected quality and production. This disease was first noted over 60 years

ago. In 2003, CARDI undertook a short research consultancy for the Grenada Co-operative Nutmeg Association (funded by the European Union) under the CARTF (Caribbean Agricultural Research and Training Fund) programme. CARDI discovered that the causal agent was a root rot (not a wilt), the fungus *Pythium* spp. When the symptoms became visible by wilting on the tree canopy, most of the feeder roots were already dead; so successful treatment depended on examination of roots and inoculation with appropriate fungicide.

3.2 *Livestock*

3.2.1 *Small ruminants*

In Antigua and Barbuda, CARDI provided technical support in the evaluation and selection of sorghum (*Sorghum vulgare* L.) as a supplement animal feed for semi-arid environments. Cultivars were obtained from CIMMYT; close to 20 ha was established on 14 farms. The next phase will be to facilitate the production, conditioning and storage of seed.

In Jamaica, experiments were conducted in the areas of goat breed improvement and cost-effective and sustainable feeding and production systems. Two locally adapted forage legumes – pigeon pea (*Cajanus cajan* (L.) Mill sp.) and blue pea (*Clitoria ternatea* L.) – were evaluated over two growing seasons and the effects of season of sowing and age at first cut were examined. It was found that pigeon pea does not adapt to a repeated cutting regime. Blue pea, however, has potential as a fodder crop due to its high crude protein concentration and ability to sustain an 8-week cutting interval.

Results of a study to evaluate levels of inclusion of alfalfa hay (*Medicago sativa* L.) in grower/finisher feeding systems showed that chevon and lamb can be produced economically by employing feeding systems that use high levels (60-100%) of alfalfa during the growing period and by-product concentrate feed during the finishing period.

The Sam Motta Demonstration and Training Centre (SMDTC) in Jamaica is located on mined out bauxite land and is used for research and demonstration on small ruminant production in those conditions. Alfalfa, mulberry (*Morus* spp.) and mucuna (*Mucuna pruriense* Adans.) are being used to develop forage based feeding systems and to improve the quality of the land. Tree cops are also being used in the rehabilitation process.

In Trinidad and Tobago an island wide survey was conducted to establish the state of Johne's Disease in small ruminants. This led to the development of a comprehensive management strategy for the disease.

Also in Trinidad and Tobago a project evaluated the growth and carcass performance of cross-bred lambs fed based diets of bagasse and 14% commercial ration.

3.2.2 Cattle

CARDI provides technical support to continued modernisation and development of the dairy industry in Trinidad and Tobago. CARDI is working with Nestlé to develop a number of model farms. Component technologies are tested by CARDI for transfer to dairy farmers that supply milk to Nestlé. CARDI evaluated a grass from Mexico called Mulato (*Brachiara* sp.); farmers reported increases in milk production when this forage was included in the diet of their dairy cows.

3.3 Enterprise Development

3.3.1 Post harvest

In Belize, advanced post harvest technologies for the storage of grains and pulses are being used to help rural farm families improve their standard of living. Twenty farm families were provided with the equipment and training needed to successfully store shelled corn (*Zea mays* L.). This equipment comprised driers, moisture testers and thermometers.

Under the EU CARTF funds, the Belize unit provided research and training to four entrepreneurs. These included:

- ◆ Formulation of cassava (*Manihot esculenta* Crantz) and soybean (*Glycine max* L.) based animal feed for commercial production.
- ◆ Use of dried pineapple (*Ananas comosus* (L.) Merr.) in the development of value added products.
- ◆ Production and marketing of bread manufactured from cassava (*Manihot esculenta* Crantz).
- ◆ Improved marketing of cashew (*Anacardium occidentale* L.) products.

In Antigua and Barbuda, CARDI conducted research and training in quality control systems for herbs and spices. A detailed quality control manual was developed and is being used to produce dried herbs and spices of consistent quality. Also in Antigua and Barbuda training and demonstration sessions were held in the areas of tanning and leather craft. This transferred research of CARDI and training participants are now able to produce a wide range of products from the skins of sheep and goats.

Enterprise development activity in Dominica was carried out in a project completed for the Nature Island Pineapple Producers Association (NIPPA). A pineapple (*Ananas comosus* (L.) Merr.) manual and video were produced detailing production, harvest and post harvest handling technologies.

Six enterprise development projects in St. Lucia were completed:

- ◆ Rabbit producers benefited from a project which improved rabbit-production systems.
- ◆ CARDI conducted personnel training and provided a manual for HACCP (Hazard Analysis of Critical Control Points) compliance for a trading company.
- ◆ A market information system for a farmers' organisation was established.
- ◆ A feasibility study of the floral industry was conducted.

- ◆ Technical assistance was provided for the construction of two banana (*Musa* sp.) ripening facilities.
- ◆ Pack house operators were trained in post harvest handling of breadfruit (*Artocarpus altilis* Park Fosberg).

Work on behalf of the Agricultural Society of Trinidad and Tobago was done to select and produce seed of a pumpkin (*Cucurbita pepo* L.) line suitable for export. Through careful selection and breeding researchers were able to identify a suitable line.

CARDI is a major contributor to the Montserrat government project to develop the local cassava (*Manihot esculenta* Crantz) industry. The objective is to produce cassava value added products for use of the Montserrat diaspora and for the local population. Because of volcanic eruptions there are now around three times the number of Montserratians outside Montserrat compared to those living on the island. Cassava bread is a traditional food in Montserrat.

Work in St. Vincent and the Grenadines is developing a system for the commercial production of seedlings and vegetables under shade houses.

3.3.2 Marketing

Some of the studies completed by CARDI's marketing unit were:

- ◆ Assessment of the convenience food trade in supermarkets.
- ◆ Potential of local producers to supply the hospitality sector in St. Vincent and the Grenadines.
- ◆ Development of an agricultural marketing plan for St. Kitts and Nevis.

3.4 Natural resource management

3.4.1 Organic agriculture

Most of CARDI's work in organic agriculture is being done at two centres, namely Jamaica and Trinidad and Tobago.

3.4.1.1 Jamaica

A trial was conducted to evaluate different organic mulches in cabbage production. The mulches used were derived from the following plant species:

Neem (*Azadirachta indica* (A. Juss)), Quick Stick (*Gliricidia sepium* (Jacq.)), Leucaena (*Leucaena* sp. (Benth)), Velvet beans (*Mucuna* sp. (Adans)), and Guinea grass (*Panicum maximum* Jacq.). The results showed that *Gliricidia*, *Mucuna* and Guinea grass were the most successful in controlling weeds.

Studies were conducted to evaluate the effects of three organic manures – cow manure, goat manure and vermicompost from coffee – on the growth of callaloo (*Amaranthus* sp.) and hot pepper (*Capsicum chinense* Jacq.). The data indicated that cow manure and goat manure had a more beneficial effect than vermicompost on the yield of both callaloo and hot pepper.

3.4.1.2 Trinidad and Tobago

The main thrust of the organic agriculture work in this country is technology and information transfer. CARDI's organic agronomist based in Trinidad and Tobago has also travelled to several other Caribbean countries to hold sensitisation workshops.

A project is underway to assess the agronomic requirements of medicinal plants grown under organic conditions. This is a collaborative project with the Caribbean Herbal Business Association and IICA.

In Tobago, CARDI is establishing a certified organic demonstration farm at a 4.4 ha site. Species so far established include cocoa (*Theobroma cacao* L.), sweet tamarind (*Tamarindus indica* L.), lemon grass (*Cymbopogon citratus* Roberty), mango (*Mangifera indica* L.), leucaena and *gliricida*.

In collaboration with the Agricultural Society of Trinidad and Tobago, a diagnostic study of key organic agriculture stakeholders in Trinidad and Tobago was undertaken. This is providing CARDI with the information needed to develop organic agriculture technologies appropriate to the region.

3.4.2 Integrated Pest Management (IPM)

Entomologists in Jamaica have been working to control pests in sweet potato (*Ipomoea batatas* L.) using a wide range of IPM practices. The results of this work are being transferred to other countries and scientists from Jamaica are conducting intensive training sessions throughout the region to provide information on the control of the major pests.

DNA sequencing work in gall midge larvae, a major pest of hot pepper (*Capsicum chinense* Jacq.), suggest that there are two distinct species or sub-species affecting the crop.

The Coffee Berry Borer (CBB) project in Jamaica was completed. This project developed protocols for mass rearing of parasites to manage the CBB (*Hypothenemus hamper* Ferrari), a pest of coffee (*Coffea arabica* L.). An IPM strategy for the management of CBB was also implemented on farm.

Also in Jamaica, CARDI is one of the principal agencies supporting the Citrus Replanting Project. This project became necessary due to the devastation caused by the Citrus Tristessia Virus, which resulted in millions of dollars of losses to the industry.

The sweet potato (*Ipomoea batatas* L.) weevil, *Cylas formicarius*, is a major problem in St. Kitts and Nevis. Work on the CARDI field station has determined the tolerance of the different local and introduced varieties.

CARDI's entomologist in St. Kitts and Nevis also provided technical support in the integrated management of the West Indian Fruit Fly (*Anastrepha obliqua*). Research

activities were aimed at elucidating the seasonal distribution of the pest in orchards with varying types of fruit. The data showed that peaks in fruit fly populations are consistent with the phenology of certain orchard crops and with the level of field sanitation.

In St. Vincent and the Grenadines a trial was carried out to investigate control of the sweet potato grub (*Phyllophaga* spp.) which was identified as a major problem after a survey (see 3.1.2.1). Three chemicals, Actora[®], Neem-X[®] and Pirate[®] were evaluated to determine efficacy in the control of the grub. Tubers in the Actora sprayed plots had significantly less grub damage than tubers in plots sprayed with either Neem-X or Pirate.

The work in Grenada which identified *Pythium* spp. as the causal agent of nutmeg root rot disease is described in 3.1.4. CARDI is now working with stakeholders to develop a comprehensive management strategy to control this disease.

In 2003 and 2004, scientists of the CARDI unit in Barbados continued to successfully control the sugarcane moth borer (*Diatraea saccharalis* Fabricus) one of the major pests of sugarcane (*Saccharum* sp.).

A survey was carried out in Guyana to determine whether Ratoon Stunting Disease in sugarcane was present. After analysis of the survey results, CARDI scientists have concluded that Ratoon Stunting Disease is present, but the exact level of incidence will require a larger survey.

In Nevis, the Four Seasons Hotel requested technical assistance to determine the cause of a sudden decline in palms. CARDI's plant pathologist visited the island and determined the problem is due to Lethal Yellowing. CARDI will provide technical assistance to mitigate the effects of this disease.

CARDI completed an activity which was part of the European Union Caribbean Agriculture and Fisheries Programme IPM Project. The activity involved the establishment of a whitefly and whitefly-transmitted geminiviruses database for the

Caribbean. Many challenges were faced in obtaining information from some countries. In addition, translation of non-english documents was necessary. Also considerable 'grey' literature was unearthed. The information gathered indicates that much of the required component research has been effected somewhere in the Caribbean, often with good results. Research activity in this area is highest in the Dominican Republic and Jamaica followed by Martinique, Puerto Rico, Trinidad and Tobago and Guadeloupe.

3.4.3 Soil and water conservation

CARDI completed work in the project co-ordinated by the Department of Life Sciences of the University of the West Indies, Jamaica and funded by the Department for International Development (DFID) of the United Kingdom. This project had focal points in St. Lucia and Jamaica and was concerned with soil management and farming practices, including the use of agro-chemicals. Among the recommendations made were the following:

- ◆ IPM systems that reduce pesticide use on crops should be introduced and recommended.
- ◆ Socio-economic analyses should be conducted for different farming practices
- ◆ Training courses on environmental protection should be conducted; these will include encouragement of practices to reduce erosion.
- ◆ A comprehensive well developed integrated management of pests and pesticides programme should be designed.

In Guyana work was carried out to improve the productivity of the sandy, low fertility soils in the Moblissa district. A programme of ecological soil management was developed. This increased overall crop performance and reduced irrigation requirements in brassicas (*Brassica* spp) and tomato (*Lycopersicon esculentum* Mill).

3.4.4 Biotechnology

In Trinidad and Tobago, CARDI is represented on the national biosafety committee which is working to develop a national policy and regulations governing the trade in living modified organisms.

Work in Barbados is talking place to conserve germplasm of sweet potato (*Ipomoea batatas* L.). Thirty accessions have now been cultured. Also in Barbados, research is investigating ways of propagating hot pepper (*Capsicum chinense* Jacq) through anther culture as well as developing micropropagation techniques for sugarcane (*Saccharum* spp.).

3.5 Information and Communication

The Information and Communication Department has three major sub-programmes which are very briefly described below:

3.5.1 Information management and network co-ordination

CARDI carries out the function of Regional Branch Office for the Caribbean of the Netherlands based Technical Centre for Agriculture and Rural Development (CTA). Among the many activities undertaken were:

- ◆ Support to the launch of the Regional Agricultural Policy Network
- ◆ Support to CariPestNet, a network which identifies and analyses plant diseases
- ◆ A survey of Caribbean farmer organisations and NGOs
- ◆ A project to strengthen regional fisher folk organisations
- ◆ Organisation and management of fisher folk organisations
- ◆ Organisation of training courses
- ◆ Management of question and answer services
- ◆ Seminars and conference support
- ◆ Work with the Caribbean Poultry Association to assess the opportunities in developing a competitive Caribbean table egg industry

- ◆ An assessment of information needs in Caribbean states

3.5.2 Corporate communications and publications

This includes the following:

- ◆ Providing information and documentation
- ◆ Desktop publishing and reprographic services
- ◆ Cataloguing and classification
- ◆ Photographic library
- ◆ Internal seminars and workshops

3.5.3 Information and communication technology

Besides routine work under this sub programme, CARDI provided technical assistance in the design of a communications strategy aimed at the better management of agrochemicals in the region.

4.0 Other support services and networking

4.1 PROCICARIBE

The PROCICARIBE system was reviewed by a consultant Dr. Walter Jaffé of Venezuela and his report was presented to CARDI and IICA. Dr. Jaffé presented a number of scenarios for the future of PROCICARIBE. None of the scenarios is completely satisfactory to CARDI, although we strongly agree with many of Dr. Jaffé's observations including the function of networking, which must not be confused with carrying out research programmes

CARDI proposes that PROCICARIBE should concentrate on the sharing of information, making heavy use of modern electronic communications. An audit of the existing networks will be done and those which are active will be identified and supported. Networks which support CARDI's priority commodities will be encouraged. A network is only strong if its members actively support it. Resources and effort should not be put into non-functioning networks.

4.2 *Biometrics*

The major objectives of this sub programme are ‘to provide a biometry statistics and scientific quality control service that will ensure scientific integrity of the programmes and projects of the institute’ and “to provide a biometry and statistics service to clients and collaborators”. Around 100 clients, internal and external to CARDI are serviced each year.

4.3 *Project development and planning*

The objectives of this unit are:

- ◆ Mobilisation of resources through the submission of project proposals
- ◆ Ensuring timely and adequate reporting of projects being implemented
- ◆ Co-ordination of the development of project proposals
- ◆ Exploring new collaborative partnerships and donors
- ◆ Monitoring and evaluation of project implementation

4.4 *Corporate services*

These comprise human resource management and finance systems which have not changed significantly (except for the appointment of the new Executive Director) over the last two years.

A financial statement for resources allocated from IICA under the IICA/CARDI co-operation programme is attached. It should be noted that this support from IICA has contributed significantly to the work of CARDI in the region. CARDI is grateful for this form of assistance as it seeks to strengthen its activities in the region and beyond and looks forward for continued collaboration and co-operation with IICA and other Agencies.

CARIBBEAN AGRICULTURAL RESEARCH AND DEVELOPMENT INSTITUTE

RECEIPTS & PAYMENTS STATEMENT

**IICA/CARDI Cooperation Programme of Joint Projects
for the period 31st December 2002 to 31st December 2004**

Expressed in US\$

	Receipts	Payments	Balance
Balance at December 31 2002	749.315,53	546.976,31	132.320,87
Reimbursement to CARDI as per report 17/2/03		9.488,00	
CARTF Fund Advance - Acerolla Project 6/2/03		4.000,00	
CD ROM Project 17/2/03		3.000,00	
Travel To International Potato Centre 21/2/03		4.122,00	
Support to CAMID 26/2/03		5.000,00	
Small Ruminant Project - Johne's Disease 21/5/03		23.600,00	
CARTF Fund Advance - Granma Aki Project 4/6/03		2.000,00	
Interest to 01/01/03 to 30/06/03	2.725,75		
Balance at June 30 2003	752.041,28	598.186,31	153.854,97
Organics - National Sensitization workshops 23/7/03		6.560,00	
CAMID Support 23/7/03		5.000,00	
CARTF Fund Advance - Patricia Sam - Cassava Bread project 11/8/03		1.245,00	
Morera Forage Project 18/8/03		7.620,00	
IICA - Small Ruminant Workshop		21.659,00	
CARTF Fund Advance - Max Smith Enterprise Ltd 17/9/03		1.000,00	
CARTF Fund Advance - 7/10/03		6.230,75	
CARTF Fund Advance - Max Smith Enterprise Ltd 29/10/03		700,00	
Payment 30/10/03 - Gregory Robin ISTRC Meeting		3.830,00	
CARTF Fund Advance - 26/11/03 - BECIS Ventures Barbados		3.000,00	
CARTF Fund Advance - Max Smith Enterprise Ltd 14/11/03		2.500,00	

IICA - Caribbean Herbal Business Association		30.000,00	
Interest to 01/07/03 to 30/09/03	1.795,31		
Balance at December 31 2003	753.836,59	687.531,06	66.305,53
Convenience Food Project 14/1/04		7.000,00	
Trinidad Rabbit Breeders Association (CARDI/IICA revolv.) 3/3/04		1.644,00	
Mobile Kitchens Ltd. (CARDI/IICA revolv.) 8/3/04		2.188,75	
Procaribe Review 26/3/04		13.977,00	
Executive Director Support 31/3/04		22.500,00	
Soils Monograph - Prof. Ahmad 27/4/04		2.018,00	
Executive Director Support & Project Funds 3/11/04	70.000,00		
Transfer for Executive Director - 3/11/04		67.500,00	
Transfer for "Development of Vegetable Seedlings 3/11/04		2.500,00	
Interest to 01/01/04 to 31/12/04	716,80		
Balance at December 31, 2004	824.553,39	806.858,81	17.694,58