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Acronyms

SCs Caribbean Community Climate Change Centre
ACE Automated Canopy Estimator
ACP African, Caribbean and Pacific Group of States
AFNC Agriculture, Food and Nutrition
APCC Asian Pacific Coconut Community
APHIS Animal and Plant Health Inspection Service of USDA
APP Agriculture Policy Programme
BAM Banana Accompanying Measures
BSD Black Sigatoka Disease
CABA Caribbean Agribusiness Association
CARDI Caribbean Agricultural Research and Development Institute
CARICOM Caribbean Community
CARIFORUM The Forum of the Caribbean Group of African, Caribbean and Pacific (ACP) States
CARPHA Caribbean Public Health Agency

CDB Caribbean Development Bank
CDEMA Caribbean Disaster Emergency Management Agency
CFC Common Fund for Commodities
CFCS Caribbean Food Crops Society
CIMH Caribbean Institute for Meteorology and Hydrology
CIMMYT International Maize and Wheat Improvement Center
CIRAD Centre de coopération internationale en recherche agronomique pour le développement (The French Agricultural Research Centre for International Development)
CIRCA Climate Impacts and Resilience in Caribbean Agriculture
COTED Council for Trade and Economic Development of CARICOM
CPDN Caribbean Pest Diagnostic Network
CPHDF Caribbean Plant Health Directors’ Forum

CARDI Annual Report 2015

CR CARDI Representative
CreWSIP Caribbean Regional Climate Resilience and Water Security Investment Plan
CRFM Caribbean Regional Fisheries Mechanism
CSEC Caribbean Secondary Education Certificate
CTA Technical Centre for Agricultural and Rural Cooperation ACP- EU
CTV Citrus Tristeza Virus
CXC Caribbean Examinations Council
DOA Department of Agriculture
EC$ Eastern Caribbean Dollar
ED Executive Director
EDU European Union
EU European Union
EU Food and Agricultural Organization of the United Nations
EPS Farmer Field School
GAP Good Agricultural Practices
GLDA Guyana Livestock Development Authority
GoJ Government of Jamaica
GTC General Technical Cooperation Agreement

IC Independent Contractor
ICT Information and Communications Technology
ICU Information and Communications Unit
IDM Integrated Disease Management
IIICA Inter-American Institute for Cooperation on Agriculture
IIA International Institute of Tropical Agriculture
IMPACS Implementation Agency for Crime and Security
INEA International Network for Edible Aroids
ITC Information and Trade Centre
JaREEACH Jamaica Rural Economy and Ecosystems Adapting to Climate Change
JAS Jamaica Agricultural Society
LAI Leaf Area Index
MANR Ministry of Agriculture and Natural Resources
MOAF Ministry of Agriculture and Fisheries
MOU Memorandum of Understanding
MTP Medium Term Plan
NAREI National Agricultural Research and Extension Institute
NCCARD National Coordinating Committee for Agricultural Research and Development
Overview

The year in review, 2015, marked the mid-point of the 2014-2016 Medium Term Plan (MTP 2014-2016), of the Caribbean Agricultural Research and Development Institute (CARDI). During the period of the MTP 2014-2016, the conduct of the Institute’s business has been guided by its Vision, “The Centre of Excellence in the Caribbean, conducting research for development that creates wealth and competitiveness in the Region’s agriculture”, Mission, “to contribute to the sustainable development of Caribbean people by the generation, transfer and application of appropriate technologies through agricultural research for development” and Core Values, “integrity, professionalism and excellence in everything we do.”

We wish to acknowledge two individuals for their contribution and leadership to the development and implementation of the MTP 2014-2016. In 2015, we said goodbye to Dr Arlington Chesney, the principal architect of the MTP 2014-2016, after 8 years of sterling service as the Executive Director (ED) of CARDI. At the same time, we welcomed Mr Barton Clarke as the new ED of the Institute, who would guide CARDI through the end of the MTP 2014-2016.

The MTP 2014-2016 is structured around three Strategic Axes: Developing Sustainable Industries, Building Strategic Linkages and Institutional Strengthening, within which the programme of work for 2015 was executed. The 2015 programme of work focused, in the first instance, on efforts towards the development of sustainable industries for selected commodities of regional importance. The selected commodities included roots and tubers, cereals and grain legumes, herbs and spices, coconut and small ruminants. Additionally, the 2015 programme of work included key and emerging thematic areas such as: protected agriculture, plant and animal genetic resources, agro-energy, invasive species and climate change.

The core funds for the execution of the 2015 programme of work were subventions from Member States (Antigua & Barbuda, Barbados, Belize, Cayman Islands, Dominica, Grenada, Guyana, Jamaica, Montserrat, St Kitts and Nevis, St Lucia, St Vincent & the Grenadines and Trinidad & Tobago).
We said Goodbye…

CARDI Annual Report 2015

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CARDI said goodbye to Dr H. Arlington D. Chesney after 8 years of dedicated service to CARDI. In October 2007, Dr Chesney took over the helm of CARDI. During his tenure with the Institute, Dr Chesney continued assiduously to raise the profile of CARDI and heightened the awareness of the pivotal role of CARDI to Caribbean agriculture development. His efforts resulted in CARDI attracting respect regionally and internationally, which in turn enabled the Institute to be continuously selected as a respected partner in the implementation of regional projects. As a direct result, external funding increased by almost ten-fold, thereby lessening the reliance on dwindling government subventions for the conduct of the Institute’s programme of work. Dr Chesney firmly believed in working together, and so under his stewardship, CARDI was able to strategically align itself and form partnerships with key regional and international organisations, working in the area of agriculture for development, in Africa, Asia, China, Indonesia and the Pacific.

Prior to joining CARDI, Dr Chesney was IICA’s Director of Operations and Regional Integration, Caribbean and prior, he headed the Caribbean Food Corporation.

Dr Chesney was one of the chief architects of the Jagdeo Initiative, a strategy designed to reposition agriculture development in the Region. He also advocated for and was central to the establishment of the Alliance for Sustainable Development of Agriculture and Rural Milieu, as well as, the Region’s premier agricultural event, the Caribbean Week of Agriculture (CWA). Among his many accolades, are the Emeritus title conferred to him by IICA in 2008 and the Golden Arrow of Achievement awarded to him by the Government of Guyana in 2011.

The staff of CARDI offers sincerest thanks and deep appreciation to Dr Chesney for his outstanding services and unfailing dedication to the Institute and by extension the Region and conveys to him warm wishes for continued active life, good health and happiness.

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These funds were substantially supplemented by project resources from donor agencies and partner institutions. There were 14 such projects that formed the bulk of the 2015 programme of work. These were: Caribbean Action under the 10th EDF Intra-ACP Agriculture Policy Programme (APP Project), sundry projects under the Cooperative Programme between the Inter-American Institute for Cooperation on Agriculture (IICA) and CARDI (IICA/CARDI Cooperative Programme), Establishment of Demonstration Pilot Plots and carrying out Training of Farmers in support of the initiative ‘Integrated Development of Cassava in the Caribbean’ (FAO Cassava Project); Project Grow: Partnering on Initiatives to Increase Access to Quality Cassava Planting Material in Jamaica (Red Stripe Project Grow), Repositioning the Coconut Industry within nine Caribbean countries for resuscitation and sustainable development (ITC Coconut Project), Diversification of the Caribbean Livestock Sector through the Production of Small Ruminants (Common Fund for Commodities-Caribbean Development Bank (CFC-CDB) Small Ruminant Project) and Caribbean Regional Small Ruminant’s Industry Technical Support Project (New Zealand Small Ruminant Project).

The others included, Development of Technological Packages for Selected Commodities in St Lucia (Banana Accompanying Measures - BAM St Lucia Tech Packs Project), The Conduct of Value Chain Analysis for Fruits and Vegetables and Livestock in St Vincent and the Grenadines (BAM SVG Value Chain Project), Value Chain Analysis for Specified Crop and Livestock Commodities (BAM St Lucia Value Chain Project), Adapting Clonally Propagated Crops to Climatic and Commercial Changes (SPC Taro Project), Assessment of the production of co-products and by-products of the conversion of the castor beans to biodiesel (PC2 Biofuels Project), Development of an Integrated Disease Management Programme for Black Sigatoka (DB BSD Project) and Improving Caribbean Food Security in the Context of Climate Change (10th EDF Food Security Project).
CARDI extended a warm welcome to our new Executive Director, Mr Barton Clarke. He assumed duties as Executive Director on 12 May 2015. Mr Clarke brings to the position a wealth of professional experience in agricultural development and a deep understanding and knowledge of the Region’s political and socio-economic systems.

In his new position, Mr Clarke will be responsible for overseeing the development and implementation of the Institute’s programme of work, inclusive of donor-funded projects. He will also lead resource mobilisation activities, so as to increase scientific and technological research, innovation and partnerships, critical to boosting the Region’s agricultural sector.

This is Mr Clarke’s second stint at CARDI. During the period 1984 – 2001, he held various positions at CARDI including, Country Representative for Barbados, St Lucia and Dominica, Deputy Director, Technical Programmes for the Organization of Eastern Caribbean States (OECS) and Project Manager for European Union (EU) and the United States Agency for International Development (USAID) funded projects. Prior to joining the Institute as Executive Director, he held the position of Chief Agricultural Officer in his native Barbados. This was his substantive position after being on secondment to the Food and Agriculture Organisation of the United Nations (FAO) Office in Trinidad and Tobago. Mr Clarke served as the FAO Representative for Trinidad and Tobago and Suriname, from September 2011 to September 2014. Mr Clarke succeeds Dr H. Arlington D. Chesney as CARDI’s Executive Director.

In the following, we highlight some of the key achievements and outcomes from the Institute’s work during the reporting year.

**Highlights of Report**

The achievements and outcomes from the 14 projects constitute the major part of the contents of this report, which highlights our contribution to the development of sustainable industries for the selected commodities and the advancement of key and emerging thematic areas.

In Jamaica, we supplied the Red Stripe brewery company with the produce from 12 ha (30 acres) of cassava for use in beer production and also delivered planting material for establishing 160 ha (400 ac) of new cassava crop.

The CARDI Grenada Unit introduced into the island, from the CARDI Belize Unit, the open-pollinated corn variety, CARDI YC-001, which after evaluation, was found to be highly acceptable for the roast and cooking corn culture of the island.

Mr Clarke succeeds Dr H. Arlington D. Chesney as CARDI’s Executive Director.

In May 2015 we welcomed Mr. Barton Clarke as CARDI’s new Executive Director.

In St Lucia and St Vincent and the Grenadines, through bids won for value chain analysis under the Banana Accompanying Measures (BAM), the relevant commodity chains were selected and mapped and field surveys of the stakeholders in the chains were completed.
In Nevis, we collaborated with IICA under the IICA/CARDI Cooperative Programme to commission a new Protected Agriculture (PA) structure, established the first crop under the structure and conducted one training session for the farmers and youths on the island.

In Antigua and Barbuda, photographic descriptors were documented by the Unit following morphological characterisation of 70 sweet potato accessions, found on the island.

In St Lucia and St Vincent and the Grenadines, promising selections from the Pacific taro genetic material (15 and 25 respectively) were made based on adaptability, corn characteristics, yield potential and taste. Also, pure-bred breeding stock for Jamaica (244) and Trinidad and Tobago (258) under the CFC-CDB Small Ruminant Project, were procured.

We concluded from the previous years’ evaluation of the feedstock production potential of castor varieties that, though perennials, on reclaimed bauxite soils of Jamaica, the castor plants behaved as annuals in the seed production pattern and should be replanted annually to obtain the true feedstock production potential. In 2015, we started a follow-up work to assess the feasibility of producing co-products and by-products of the conversion of castor beans to biodiesel.

With regards to the management of the Black Sigatoka Disease (BSD), we obtained BSD tolerant banana and plantain varieties from international centres, successfully multiplied them in vitro and started planting them out in the field in Dominica, St Lucia and St Vincent and the Grenadines for production and productivity assessment. An expert Plant Pathologist, also contracted under the CDB BSD Project, developed an Integrated Disease Management (IDM) framework to be used to train stakeholders in the management of the disease.

In order to mitigate against the threats that climate change poses to the Region’s food security, CARDI Units in Barbados, Belize and Trinidad and Tobago identified and selected varieties of sweet potato, corn, peas and beans that possess resilience to prolonged dry and wet periods, from the preliminary evaluations. The report also includes an account of the capacities that we built in stakeholders. In all, we strengthened the knowledge and skills of approximately 690 stakeholders in the development of sustainable industries, for the selected commodities and of the key and emerging thematic areas.

The report also points to how CARDI, as an institution, was strengthened in the areas of human, technical and physical resources, during the execution of the 2015 programme of work. For example, a new filing system was developed and CARDI’s Accounting Manual was revised to be in line with the structures of the MTP. The APP Project assisted us to improve the infrastructure on CARDI field stations to efficiently develop, multiply and conserve crops and small ruminant germplasm, as well as to manage and feed small ruminants. Similarly, the 10th EDF Food Security Project provided the CARDI Units in Barbados, Belize, St Kitts and Nevis and Trinidad and Tobago with Davis weather stations and Davis agricultural modules.

During the year, 36 CARDI personnel, including Independent Contractors and on the job trainees benefited from skills and knowledge enhancement in the programme areas. We recognise the need to promote the quality work that we do and show visibility to the CARDI Member States and our other partners and accomplished this using Face to Face (F2F) interactions, Traditional Media and Web-enabled Tools.

In CARDI, we also recognise that building and strengthening partnerships are pivotal to the successful delivery of our programme of work. Accordingly, in 2015, we forged new partnerships with national entities (Marketing and National Importing Board of Grenada and Baron Foods Ltd. of St Lucia), hemispheric institution (the Yucatan Center for Scientific Research (CICY) of Mexico) and under the umbrella of CARICOM, with two foreign governments (CARICOM/New Zealand and CARICOM/India). At the same time, we committed ourselves to partnering with two of our long-standing partners, the Inter-American Institute for Cooperation on Agriculture (IIAC) and the Technical Centre for Agricultural and Rural Cooperation ACP-EU (CTA).

As alluded to earlier, the Institute’s programme of work is funded primarily from Member States subvention and external funds garnered from funding agencies and institutions. However, the Institute makes concerted efforts to generate supplementary funds internally. In 2015, we obtained a net revenue of EC$82,552 from our internal revenue generation efforts, including the production and sale of quality seeds, commercial production and sale of grains and provision of services for the sale of Seminis® (a subsidiary of Monsanto®) seeds across the Region and the export of fresh fruits to Canada.
Sustaining Industries for Selected Commodities of Regional Importance

CARDI has a mandate, through regional consultations and guided by CARICOM positions and policies, to conduct research to improve the production and productivity of selected non-traditional and some traditional re-emerging commodities, towards the development of sustainable industries for these commodities. The aim is to contribute to the Region’s food and nutrition security, drive export and help reduce the Region’s food import bill, as well as to assist in wealth creation and competitiveness in the regional agriculture. The selected commodities are roots and tubers, cereals and grain legumes, herbs and spices, coconuts and small ruminants.

Roots and Tubers

Root and tuber crops constitute one of the major non-traditional commodities that has great potential for achieving the overall aim for the development of sustainable industries, for selected non-traditional and some traditional re-emerging commodities.

In 2015, our interventions to improve production and productivity of roots and tubers, focused more on cassava.

Cassava

Under the EU-funded project, "Caribbean Action under the 10th EDF Intra-ACP Agriculture Policy Programme" (APP Project), two cassava planters, one each for Guyana and Jamaica, were procured. These were used to demonstrate mechanised cassava production in the two countries with the expectation that the mechanised technology could be replicated in other countries of The Forum of the Caribbean Group of African, Caribbean and Pacific (ACP) States (CARIFORUM).

CARDI is responsible for developing and demonstrating technologies to improve the production of cassava in Grenada, Guyana and Jamaica, under the FAO project titled, "Establishment of Demonstration Pilot Plots and carrying out Training of Farmers in support of the initiative ‘Integrated Development of Cassava in..."
the Caribbean” (FAO Cassava Project). In 2015, we completed technical packages ('tech packs') for small-scale production, which were used to guide the establishment of two 0.4 ha (1 ac.) plots each in Grenada and Guyana. The Red Stripe brewery company, Jamaica seeks to replace 20% of imported barley with cassava as input for brewing beer. The CARDI Jamaica Unit, under a contract, through the Red Stripe Project Grow, that concluded in June 2015, supplied Red Stripe with 12 ha (30 ac.) of cassava for use in the beer production. Planting material for establishing 160 ha (400 ac.) of new cassava crop was also delivered to the company. Sweet potato In order to expand the pool of sweet potato germplasm available to farmers, the CARDI Grenada Unit, under the IICA/CARDI Cooperative Programme, evaluated, for potential tuber yields and market acceptance, seven sweet potato varieties (AVRDC CR 1517-139, AVRD-CRISIO, CARDI Big Red, CIPRO 150, Papota, 'Unknown' and Viola), known to have performed well in other parts of the Region and obtained from the St Vincent and the Grenadines tissue culture laboratory. The results indicated that the varieties, AVRDC-CR 1517-139 and AVRDC-CRISIO gave the highest yields, 5.05 and 4.28 kg (11.1 and 9.4 lb) per plot (4.86 m² (52 ft²)), respectively. These two varieties were then compared against two local varieties, Reggie and Toco. Again, AVRDC-CRISIO and AVRD-CR 1517-139 were the highest yields, 4.77 and 4.35 kg (10.5 and 9.6 lb) per plot, respectively. All the introduced varieties adapted very well to the Grenadian conditions. Subsequent organoleptic tests showed that consumers generally accepted all the varieties. In terms of texture, 56% of consumers rated CIPRO 150 as the driest while the same percentage rated AVRDC-CR 1517-139 as softest and 'Unknown' as the stickiest. For sweetness of flavour, all the consumers preferred AVRDC-CRISIO. In future work programmes, these results would be validated on-farm. At the CARDI Montserrat Unit, 12 sweet potato varieties were imported from St Kitts. Following evaluations under hoop house, five were selected and distributed to farmers for production on 1,000 m² (0.25 ac.) plots each. Yields ranging from 2,260 to 3,000 kg (5,000 to 6,800 lb) were obtained. The Department of Agriculture (DOA) recorded these results and disseminated the findings to other farmers, through the Extension Unit. Cereals and Grain Legumes The main thrust of CARDI, in the support of the development of the Cereals and Grain Legumes industry, is to contribute to a sustainable supply of cereals and grain legumes for food and feed in the Region, through the development and selection of suitable varieties and production and supply of quality seeds. This effort is localized in the CARDI Belize Unit and in 2015, the primary focus of the Unit was on the development, selection and evaluation of varieties adapted to extremes of weather conditions and climate change in general. The achievements of these efforts are reported under the section, "Responding to a Changing Climate". However, in Grenada, we made some interventions to improve corn production on the island. In Grenada, roast and boiled/cooking corn are very much relished. Therefore, the CARDI Grenada Unit, with the support of the IICA/CARDI Cooperative Programme compared the open-pollinated yellow corn variety, CARDI YC-001, newly introduced into Grenada from the CARDI Belize Unit, with 11 corn accessions obtained from the International Maize and Wheat Improvement Centre (CIMMYT). The results showed that the yield (seed weight/plot; plot size 4.86 m² (52 ft²)) was approximately 10% lower for the CARDI YC-001 (1.63 kg (3.6 lb)) than for the average of the 11 CIMMYT accessions (1.82 kg (4.0 lb)). However, Grenadians preferred the CARDI YC-001 to the CIMMYT accessions for roast and cooking corn. Subsequently, CARDI YC-001 corn has been shipped from the CARDI Unit in Belize and sold to producers in Grenada for commercial cultivation.
where appropriate, generate new technologies for target commodities (Component 2); Strengthening market linkages to contribute to agricultural enterprise development (Component 3).

Collaborating with IICA (also Component 1 Technical Leader), to implement the Programme are, CARDI (Component 2 Technical Leader) and the CARICOM Secretariat (Component 3 Technical Leader). The implementation of the Programme began in 2014, with the Year 1 programme of work lasting from June 2014 to May 2015. In June 2015, the Programme was suspended but was resumed in September 2015 under the new implementation phase, 1st September 2015 to 31st December 2016.

The Component 2 of the Programme, which is led by CARDI, has three Sub-components, namely: 1) Sustainable small-scale production/processing, 2) Quality plant and animal germplasm availability and 3) Climate change/variability resilience.

The Intra-ACP Agriculture Policy Programme

The Intra-ACP Agriculture Policy Programme, under which the Caribbean Action (APP Project) was implemented, straddled several areas of the programme of work of the Institute in 2015 and deserves special mention here.

The Intra-ACP Agriculture Policy Programme, with focus on the Caribbean and Pacific, is a 10th European Development Fund (EDF) funded Action, which is executed by the Inter-American Institute for Cooperation on Agriculture (IICA). The overall objective of the Programme is to enhance the regional and interregional capabilities of the agricultural sectors in eradicating poverty. It aims to improve the regional food and nutrition security by contributing to the reduction of poverty and the sustainable economic growth, of small producers/entrepreneurs of CARIFORUM Member States.

There are three Expected Results areas or Components of the Programme. These are: Strengthening regional agricultural development, policy and strategy implementation (Component 1); Improving the transfer and adoption of applied agricultural production and processing research results and technologies (Component 2) and Strengthening CARDI as Research for Development Institution of Choice in CARICOM.

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The Herbs and Spices sub-group of the AFNC is led by the Caribbean Agribusiness Association (CABA). CARDI supports CABA in the efforts to develop the Herbs and Spices Industry through its research for development activities. In 2015, as in previous years, we undertook activities to improve the production and productivity of hot pepper and selected herbal crops, but this year, we also contributed to ginger production.

Hot pepper

The hot pepper industry in Jamaica has, over the years, relied on the CARDI’s hot pepper seed production facilities (mostly the West Indies Red variety) and the seed production facilities of the Jamaica Ministry of Agriculture (mostly the Scotch Bonnet variety). In 2015, the Ministry of Agriculture and Fisheries (MOAF) decided to revamp its hot pepper seed production capabilities in order to supply more of its national needs. CARDI supported the MOAF in this effort. The CARDI Plant Breeder conducted an audit of the facilities and processes for seed production. The audit recommended (i) the insulation of the seedroom, (ii) the setting up of a Seed Quality Control Laboratory and (iii) installation of back-up power supply and quality water supply system. The APP Project supported the conduct of the audit.
Through the IICA/CARDI Cooperative Programme, CARDI and Baron Foods Ltd., St Lucia, signed a Memorandum of Understanding (MOU) to facilitate the production of hot pepper berries by selected farmers in Grenada and St Lucia, for supply to Baron Foods Ltd. and in the process, provide an avenue for the sale of CARDI hot pepper seeds. Under the agreement, Baron Foods Ltd. would provide a ready market and CARDI would provide the technical support to at least five farmers. The CARDI St Lucia Unit successfully coordinated the production to ensure that Baron Foods Ltd., St Lucia was supplied with their requirement of approximately 2,270 kg (5,000 lbs) of berries weekly through 2015, at a negotiated price of EC$3.86/kg (EC$1.52/lb) fresh weight.

Ginger

The St Lucia Government has started the process to resuscitate ginger production in St Lucia. Therefore, with funding from the IICA/CARDI Cooperative Programme, the CARDI St Lucia Unit is supporting the process. The Unit conducted a survey on production and marketing on 14 ginger farmers (71% males and 29% females) in November 2014 in the main ginger production area (Extension Region 4). The results compiled in 2015 showed that all farmers harvested their crop manually, with 57% not storing the crop whilst the rest stored in a shed on the farm or in the ground for replanting; the major constraints to production were pests, inadequate technical information and unavailability of planting material.

In 2015, a ‘tech-pack’ on improved ginger production was produced and subsequently used as a guide in establishing a demonstration plot. One improved production practices and post-harvest training workshop was conducted.

Other herbal crops

In Jamaica, for three years the CARDI Jamaica Unit evaluated the production and post-harvest practices of five herbal crops under the IICA/CARDI Cooperative Programme. The herbal crops were: blackmint (Mentha spicata, syn M. vividis), cerasee (Momordica charantia L), lemon grass (Cymbopogon spp.), peppermint (Satureja viminea) and sorrel (Hibiscus sabdariffa).

The studies were completed in 2015 and the output, “Technical Manual of Agronomic and Post-harvest Practices of Five Herbal Crops” was produced to help stakeholders to produce and process these herbal crops, to contribute to the diversification of the regional agriculture.
Developing the Regional Coconut Industry

In December 2014, the EU and the International Trade Centre (ITC) signed the Contribution Agreement for the implementation of the 3.5 million Euros project titled, “Coconut Industry Development for the Caribbean” (ITC Coconut Project), under the 10th European Development Fund (EDF) facility.

The specific objectives of the project are small scale coconut producers’ competitiveness enhancement through better regional integration and improved production performance.

The ultimate beneficiaries identified for the project are small coconut farmers, plantation operators, owners and workers, coconut producing and processing communities, young people and women in coconut and coconut product processing and marketing, SME coconut products manufacturers and their providers of equipment and services in their communities.

There are four outcomes expected for the project and these are:

Outcome 1: Market opportunities identified and value chain development plans agreed. Synergies and continuity developed with existing regional and national programmes, to enhance regional integration of markets

Outcome 2: Competitiveness and sustainability is enhanced by dissemination of production intensification methods and by improving synergies between different actors involved in value chains

Outcome 3: Access to Information and advisory services on finance, trade, agriculture, management and markets facilitated for small producers

Outcome 4: Greater access to risk management instruments, particularly on climate change and market risks, for small producers

Subsequent to the signing of the Contribution Agreement, ITC and CARDI signed a Grant Memorandum of Understanding (MOU) that appointed the latter as the regional implementing partner for the project and to act as the focal point. CARDI would also undertake a substantial amount of the work, foreseen for Outcomes 2 and 4, under this Grant.

CARIFORUM countries participating in the project are Belize, Dominica, Dominican Republic, Guyana, Jamaica, St Lucia, St Vincent and the Grenadines, Suriname and Trinidad and Tobago.

This project would be the main vehicle for the revitalisation of the regional coconut industry in the coming years. In 2015, ITC and CARDI started rolling out the project. Stakeholders in the participating countries were engaged to formulate road maps for market-led development of the coconut and coconut products sector, as well as agree on the implementation plans through Value Chain Development Road Mapping Workshops.
As part of the preparation for the implementation of the project, CARDI and ITC representatives in February 2015, attended the 51st Asian Pacific Coconut Community (APCC) Session/Ministerial Meeting, in India. The team also visited coconut research and development institutions and production and processing sites, which have technical expertise relevant to the ITC Coconut Project.

Small Ruminants

The development of the Small Ruminant Industry has been one of the primary areas of attention in the CARDI MTP 2014-2016. This is in the context of small ruminants’ potential, to make a high contribution to the food and nutrition security of the Region, sustain rural livelihoods and to be a source of easily accessible cash. Our small ruminants programme focuses on genetic improvement and production and productivity improvement, through improved feeds and feeding systems and husbandry. To complement this emphasis, the programme also includes, support to value-added initiatives and capacity building of stakeholders. The work takes place mostly in Barbados, Guyana, Jamaica and Trinidad and Tobago but the results are disseminated region-wide.

In 2015, three projects contributed to our efforts to improve the production and productivity in the Small Ruminant Industry.

In Guyana, the APP Project provided US$40,000 to boost the livestock sector, through a Memorandum of Agreement signed between CARDI and the Guyana Livestock Development Authority (GLDA), on 29 April 2015. The agreement supported targeted actions in production, nutrition and value addition of the small ruminant sub-sector.

The CFC-CDB-funded project, “Diversification of the Caribbean Livestock Sector through the Production of Small Ruminants” (CFC-CDB Small Ruminant Project) facilitated the completion of the refurbishment of the training abattoir at the MOAF Station, Bodies, Jamaica. However, the Project was awaiting clearance from the environmental agency with respect to its effluent management system before being commissioned. In addition, the classroom and dormitory facilities used for training stakeholders in small ruminant production at the MOAF Station, Hounslow, Jamaica, were substantially upgraded.

Nine small dairy goat farmers in Grenada benefitted from the IICA/CARDI Cooperative Programme, which upgraded the housing units for their goats and enhanced husbandry practices, by providing the farmers with first aid kits containing udder wash, hoof trimmers and iodine solution.

Strengthening Value Chains for Commodities Development

CARDI is one of the regional institutions/agencies with the capacity for value chain analysis and the Institute’s programme in value chains seeks to empower stakeholder actors in the processes and links in successful value chains.

CARDI successfully won bids in 2015 to conduct value chain analyses for specified crops and livestock in St Lucia and St Vincent and the Grenadines. The exercises that began in January 2015 in St Lucia and March 2015 in St Vincent and the Grenadines are continuing but meaningful progress was made on the contractual
obligations as follows: the chains for analyses - tomatoes, cassava, honey, table eggs and small ruminants (St Lucia) and tomatoes, sweet peppers, lettuce, small ruminants (St Vincent and the Grenadines) - were selected and mapped and field surveys of stakeholders in the chains were completed and the data collated for analysis. Additionally, in St Lucia, two value chain meetings were held to ensure that production factors and issues were addressed. Twenty-six farmers and four Extension Officers attended the meetings.

Also, in St Lucia, a parallel contract was negotiated for the review and updating of existing "tech-packs", or the development of new ones, for identified commodities in the categories – Food and Root Crops, Vegetables and Herbs, Cut Flowers, Fruit and Tree Crops and Livestock.

These value chain activities were funded through the Banana Accompanying Measures (BAM) and were supervised by the CARDI Units in St Lucia and St Vincent and the Grenadines.

Again, in St Lucia, Hot Pepper Producers Cluster established in 2014 by the CARDI Unit within the framework of the hot pepper value chain, remained operational. The objectives of the Cluster are to improve the market environment between hot pepper producers and hot pepper buyers and to facilitate and coordinate increased hot pepper productivity and production, thereby contributing to revitalising a viable hot pepper industry in St Lucia. The activity is funded under the IICA/CARDI Cooperative Programme.
It is an established fact that Protected Agriculture systems (PA) tend to provide favourable climatic conditions, reduce the stress levels and provide a favourable environment for crops to realise their yield potential. They promote economic and efficient use of water, significant reduction in the use of pesticides, result in healthier and quality produce, and ultimately, increased revenue for the producer.

CARDI, in the past, successfully completed PA projects funded by the CFC and CDB. In all these, our overall aim is to promote increased production and productivity of crop plants. This global objective prevailed in 2015.

In Guyana and Nevis (St Kitts and Nevis), PA systems were validated/demonstrated for vegetable production and productivity (lettuce, celery, parsley, pakchoi and poi/callaloo in Guyana and tomatoes and sweet peppers in Nevis), under the IICA/CARDI Cooperative Programme.

In Nevis, the project titled “Protected Agriculture Construction and Capacity Building of Farmers And Youths In Nevis”, reached its first milestone with the official commissioning of the PA structure at the Prospect Agricultural Station in Nevis, on 27 May 2015. A first crop was established and one training workshop conducted in September 2015, using the CARDI PA Manual. The second phase of the project will be to conduct a comparative study of production/productivity for tomatoes and sweet peppers, under PA and open field systems and to develop a programme for further training.

In Guyana, the construction and fitting of the PA structure were approximately 80% complete as the year came to an end. CARDI collaborated with IICA in the two countries in the execution of the activities.

In Montserrat, the expansion of the programme on hoop houses validated by the CARDI Montserrat Unit, was still progressing successfully under the supervision of the DOA.
Developing, Conserving and Distributing for Use of Plant and Animal Genetic Resources

The infusion of diversity in scope and quality in plant and animal genetic resources in the food systems of the Caribbean is critical for the food and nutrition security of the Region. CARDI, therefore, places great emphasis on developing, conserving and distributing, for use and resilience of plant and animal genetic resources.

Plant Genetic Resources

**Sweet potato**

In Antigua and Barbuda, photographic descriptors were documented by the CARDI Antigua and Barbuda Unit following morphological characterisation of 70 sweet potato accessions found on the island. This is the first step in the process of identification, conservation and use of sweet potato germplasm, found in Antigua and Barbuda. Ultimately, molecular characterisation, comparing these accessions with those found in other CARICOM countries, would be done. Meanwhile, the 70 accessions were being conserved in vivo on the CARDI station.

In the work aimed at expanding the sweet potato germplasm base on the island, the Antigua and Barbuda CARDI Unit recorded a six-fold increase (from nine) in the number of quality sweet potato germplasm plantlets received from the St Vincent and the Grenadines’ tissue culture laboratory, through a two-stage multiplication process. The 54 plants would be established in the field for further multiplication.

These activities in Antigua and Barbuda were supported by the IICA/CARDI Cooperative Programme.

Also, through the IICA/CARDI Cooperative Programme, the CARDI Belize Unit collected seven localised varieties of cassava (possibly earlier imported from international centres) from farmers’ fields and placed them in germplasm banks, for conservation or growing in multiplication plots for further evaluation and ultimately distribution, to farmers.
Taro/Dasheen

Taro/dasheen is a major export crop for the Windward Islands of the Organization of Eastern Caribbean States (OECS) and a key crop for the Region’s food and nutrition security. Hence, expanding the genetic base of the crop for adaptation to the changing climatic conditions is critical. Accordingly, CARDI accepted an invitation from the Secretariat of the Pacific Community (SPC) first, to join the International Network for Edible Aroids (INEA) and to partner with other 15 global institutions in the EU-funded project titled, “Adapting clonally propagated crops to climatic and commercial changes” (SPC Taro Project), to evaluate 50 selected Pacific taro/dasheen accessions. The CARDI evaluations occurred on 25 farms, at sites in St Lucia and St Vincent and the Grenadines. In the process, some local accessions were also evaluated. In both countries, promising selections from the Pacific genetic material (15 in St Lucia and 25 in St Vincent and the Grenadines) were made, based on adaptability, corm characteristics, yield potential and taste. Foliar tissue material was sent to The French Agricultural Research Centre for International Development (CIRAD) for DNA characterisation.

The selected accessions were being put through the second phase of evaluation for climate resilience by molecular and phenotypic means as the year ended. The trials in St Lucia were delayed because of the severe drought in 2014. However, in St Vincent and the Grenadines, the experimental plots were established and the appropriate parameters were being measured.

Animal Genetic Resources

The improvement in small ruminant genetic resources was pursued through the availability of semen, embryo transfer and the multiplication of quality improved breeding stock.

In Jamaica, the APP Project provided pasture development materials (fencing wire, forage seeds) and small husbandry tools, to the Network of Women for Food Security and the Carey Park Farmers Group, which were being developed as community-based improved breeding stock providers.

In Trinidad and Tobago, and also under the APP Project, the capacity of the Trinidad and Tobago Goat and Sheep Society was similarly improved, with the provision of a forced-air oven for forage quality determination and an ultrasound machine for pregnancy detection.
Supporting the Regional Agro-Energy Thrust

CARICOM has committed to developing green, renewable energy to help mitigate climate change and its deleterious impacts, to which the small island states of the Region are particularly susceptible. Agro-energy is one source of green, renewable energy. Agro-energy is very versatile; it can be developed and deployed at the farm/industry level, for example, the co-generation from sugar cane at sugar factories. It can also be developed to be fed into national electricity grids.

In Jamaica, the Petroleum Corporation of Jamaica (PCJ) is the national agency charged with spearheading the development of green energy. It researches the development of green energy from agro biomass and feedstocks. It does this by partnering with relevant institutions. CARDI is one such institution.

CARDI and PCJ established a Research Partnership Agreement in 2011 to assess the viability of producing biodiesel from locally grown feedstocks of castor bean, on reclaimed bauxite lands (PCJ Biofuels Project). The initial studies evaluated the feedstocks production potential of five varieties of castor over five years. The results showed that only three varieties, two local (Local Large and Local Small) and an introduced one (Nordestina) survived from the second year and even then, seed yields declined with time. It was concluded that on reclaimed bauxite lands, castor plants, though perennials, behaved as annuals in the seed production pattern and should be replanted annually to obtain the true feedstock production potential, especially for Nordestina variety.

This follow-up work is assessing the feasibility of producing co-products and by-products of the conversion of castor beans to biodiesel, e.g. oilseed meal to be used as a fertiliser or animal feed, glycerol to be used as a raw material in animal feed and pharmaceuticals, castor bean shells to be used in composting for soil amelioration and castor bean trees to be cut and made into charcoal or wood chips for biomass fuel or biochar for soil amelioration.

The study was in progress at the time of reporting.
Managing Invasive Species

Alien invasive species continue to be a bane of Caribbean agriculture. In the past, the Region’s agriculture suffered severe economic losses from invasive species such as: the Pink Hibiscus Mealybug (*Maconellicoccus hirsutus*, Green), Red Palm Mite (*Raoiella indica*, Hirst), Moko Disease (*Ralstonia solanacearum* Race 2), Black Sigatoka Disease (*Pseudocercospora fijiensis* (M. Morelet) Deighton) and Citrus Tristeza Virus (CTV). There are new and potentially invasive species of regional concern. These include the Black Pod disease (*Phytophthora megakarya*) and Fusarium Wilt (*Fusarium oxysporum* f. sp. cubense TR4). Nonetheless, the threats from BSD and CTV appear to be endemic and they need our continued attention.

CARDI’s approach to supporting the mitigation of effects of invasive species is two-pronged. We promote interventions designed to identify and mitigate the effects of invasive species, as well as interventions that empower stakeholders to become knowledgeable of the serious threats that invasive species pose.

Selecting BSD Tolerant Banana and Plantain Varieties

CARDI, through funding provided by the Caribbean Development Bank (CDB), is implementing the project titled, “Development of an Integrated Disease Management Programme for Black Sigatoka Disease” (CDB BSD Project). The participating countries are Dominica, Guyana, St Lucia and St Vincent and the Grenadines. Under this project, a three-prong approach is being used to develop the strategies to combat this dreaded disease that has now been detected in all the banana and plantain producing countries in the Caribbean. The three-prong approach involves the introduction and evaluation of BSD tolerant hybrid banana and plantain varieties, the development and training of regional agricultural technicians about an Integrated Disease Management (IDM) framework for the BSD management and thirdly, the training of stakeholders in Farmer Field School (FFS) practices on the integrated management of BSD. This section of the report highlights the work being done on the introduction and evaluation of BSD tolerant varieties, for the improvement of banana
and plantain production and productivity. The development of the IDM framework and the training on FFS practices are reported under, “Building Capacity of Regional Agricultural Professionals and Technicians” and "Building Capacity in Farmers and Rural Agricultural Communities", respectively.

The BSD tolerant varieties were obtained as tissue culture materials from Bioversity International, Belgium and International Institute of Tropical Agriculture (IITA), Nigeria. They included seven each of banana varieties (FHIA-01, 02, 03, 17, 18, 23 and 25) and plantain varieties (FHIA-21 and PITA-17, 21, 22, 23, 24 and 26) and they were evaluated against seven BSD susceptible Cavendish varieties (Bamboo, CV902, Grande Naine, Jaffa, Jobo17, MA13 and Williams). The tissue culture materials were multiplied in vitro, weaned and hardened, before they were established in the field evaluation plots.

In Dominica, the evaluation plots were fully established by July 2015 at the four sites (La Plaine Agricultural Station, Woodford Hill Agricultural Station, Clement Charles farm, Milton and Hordford Nicholas farm, Giraudel).

In St Lucia, the varietal evaluation blocks were established at two of the four sites during the year - CARDI Field Station, La Ressource (June 2015) and a farmer’s holding, Thiobal (October 2015). The evaluation plots would be established at Praslin and Malgretoute, both farmers’ holdings, in 2016.

The evaluation plots were fully established at all three sites in St Vincent and the Grenadines (two farmers’ holdings at Montreal Gardens and Mount Williams, and CARDI Research Station, Rabacca), by November 2015.

In Guyana, the tissue culture facility at National Agricultural Research and Extension Institute (NAREI) faced numerous challenges with the management and multiplication of the imported banana and plantain varieties and in November 2015, the Orange Hill Tissue Culture Laboratory, St Vincent and the Grenadines, agreed to receive the tissue culture materials and multiply them in sufficient quantities for the evaluation. This delayed the field plot establishment until 2016.
At all established sites, field management continued and data collection commenced three months after planting. Disease, agronomic and yield data were collected. Data collection would continue and some results would be available in 2016.

**Citrus Tristeza Virus Disease still a Threat**

Citrus Tristeza Virus (CTV) disease is still latent in St Lucia and other parts of the Caribbean. The CARDI Unit in St Lucia, therefore, continued to maintain at its field station CTV tolerant rootstock varieties (Volkameriana, Swingle citrumelo and Carrizo citrange), for the production of seed for the propagation of CTV tolerant rootstocks for farmers.

**Caribbean Pest Diagnostic Network Facilitating Regional Food Safety**

The CARDI-chaired Caribbean Pest Diagnostic Network (CPDN) of the Caribbean Plant Health Directors’ Forum (CPHDF) coordinates regional safeguarding mechanism, which would protect the Region from invasive pests and help Member States meet international Sanitary and Phytosanitary (SPS) reporting requirements. A working document for the CPHDF meeting in 2015 was crafted by the Network at its eighth meeting held in Aruba, during 7-10 July 2015.
All the available data indicate that the climate in the Caribbean is changing, getting hotter and drier. This long term climate pattern of the changing climate, is exacerbated by the cyclical El Niño and La Niña episodes that are associated with unpredictable droughts and floods. These conditions will adversely affect the viability of the regional agriculture and more so the livelihoods of smallholder farmers who mostly depend on rainfed farming systems. Therefore, CARDI has been partnering with several regional and international organisations to develop and promote systems that will help to build the resilience of agriculture in the Region, to climate change.

Selecting Resilient Food Crops Varieties

The 10th EDF Food Security Project seeks to ensure long term food security under constantly changing agro-ecological environmental conditions in the Caribbean, through the selection, multiplication, validation and management and conservation of targeted food crops germplasm. The project is being executed in Barbados, Belize, St Kitts & Nevis and Trinidad and Tobago, countries representing each climate quadrant in the Caribbean. CARDI is the Leader in the project and the Wageningen University and Research Centre (WUR) is our partner in the Project.

Varieties of sweet potato, corn, peas and beans that possess the resilience to prolonged dry and wet periods have been identified from the preliminary evaluations. These selections will be evaluated further. In Barbados, sweet potato varieties Beauregard, C109 and CBS 49, notable drought-tolerant varieties, are still under evaluations for drought resilience.

In Belize, the hybrid corn varieties (Pioneer P3523 and Pioneer P4082W) were able to withstand drought conditions much better than the open-pollinated varieties (NB-5, CARDI YC-001, NB-7, ICTA B-1, NB-6), while selected open-pollinated varieties performed better than the local varieties (Stan Creek White and Red Bank Yellow).

In Trinidad and Tobago, corn landraces NB–6 and CARDI YC–001 were the most productive in yields during both the dry and wet seasons.

The conservation, mostly in vivo but also some in vitro, of the varieties found to be resilient to climate variability, has begun in the four project countries. These genebanks facilities will contribute to ensuring the food and nutrition security of the Region.

The APP Project also contributed to the building of resilience of Caribbean agriculture to climate change, by supporting studies on the adaptation of varieties of food crops of regional importance, to extremes of weather conditions.

A number of indigenous varieties/landraces and introduced varieties were established for evaluation of tolerance to extremes of weather conditions. For the indigenous varieties/landraces, we made progress in our studies in the identification, selection and ex situ conservation for adaptability to extremes of weather in selected countries, for roots and tubers (Antigua and Barbuda, Dominica, Haiti, and Trinidad and Tobago) and for cereals and grain legumes (Belize).

Similarly, for introduced varieties, a number of selected corn and beans varieties (Belize), 25 accessions of taro/dasheen St Vincent and the Grenadines and 40 accessions of hot pepper (Trinidad and Tobago), were established for evaluation of tolerance to extremes of weather conditions.
Modelling climate resilience

Agro-meteorological parameters, such as rainfall, ambient temperature and humidity and in some cases soil temperature, soil moisture and leaf wetness, are being collected and stored through six Davis weather stations and two Davis agricultural modules and other complementary equipment in Barbados, Belize, St Kitts and Nevis and Trinidad and Tobago, under the 10th EDF Food Security Project. These data will enable a more precise definition of the climate resilience of the target crops (sweet potato, cassava, corn, peas and beans).

Parameterising the FAO AquaCrop model for sweet potato, a Ph.D. thesis, “Quantifying and predicting the impact of climate-induced drought on crop yields in Jamaica – The case of Sweetpotato” authored by Dale Rankin (UWI, Physics Department, Mona) and supervised by UWI, Mona and CARDI Jamaica Unit, has developed a model that can be now used to test drought tolerance of sweet potato, determine viable limits of production under varying water-limited scenarios and climate change, as well as assist with decision making regarding irrigation schedules and net irrigation requirements. Also through the thesis, a new software Automated Canopy Estimator (ACE) was developed, which can directly provide green canopy estimation (in percentage ground cover) using digital photography and thus, circumventing the need for calculating Leaf Area Index (LAI). During the reporting period, the results of the study were disseminated through joint UWI/CARDI presentations at the Jamaica Rural Economy and Ecosystems Adapting to Climate Change (JaREEACH) meeting, Jamaica and the Caribbean Food Crops Society (CFCS) meeting in Suriname.

Evaluating sweet potato for drought tolerance in Trinidad and Tobago

Over the years, several sweet potato varieties have become adapted to the agro-climatic conditions in Trinidad and Tobago and developed resistance to pests and diseases. Some of these have become highly acceptable to consumers. However, because of the threats and challenges posed by climate change, it has become necessary to identify, select and conserve the landraces that show tolerance to extremes of weather conditions and those that have high consumer acceptability. This can then be used to contribute to sustainable food and nutrition security for the people.

Starting with the 10th EDF Food Security Project and supported with additional funds from the APP Project, ten sweet potato varieties with high consumer acceptability were evaluated for resilience to extremes of weather conditions. These were Carrot, Certain, O 49, Ti 1955, Haggie, Margarita, K 388, John, Chicken Food and Nina. The results showed that the landraces Margarita, Carrot and O 49 and to some extent, Nina, exhibited drought tolerance. These would be conserved so quality planting material from them would be available to farmers in the future.

Regional Plans and Strategies to Respond to Climate Change Threats

During the year, several appropriate plans and strategies to develop responses to the threats of climate change to agriculture in the Caribbean were discussed at national and regional forums. Examples of such forums were the Climate Impacts and Resilience in Caribbean Agriculture: Assessing the Consequence of Climate Change on Cocoa and Tomato Production in Trinidad and Tobago and Jamaica (CIRCA), a UWI and CaribSave Partnership Policy workshop held at UWI, Mona, Jamaica on 22 January 2015, Global-Local Caribbean Climate Change Scenario Development Workshop held at UWI, St Augustine, Trinidad and Tobago during 4-5 March 2015 and a stakeholder meeting for the development of the Caribbean Regional Climate Resilience and Water Security Investment Plan (CReWSIP) held in Barbados, during 9-10 April 2015. Representatives from the CARDI Jamaica Unit participated in these forums.
Building Capacity in Farmers and Rural Agricultural Communities

Knowledge is power. For stakeholders to participate fully in the Region’s agriculture and food systems they need to be empowered in the knowledge and skills in whatever link of the value chain they participate in. CARDI’s capacity building mechanisms, group development and strengthening, germplasm management, value-adding and invasive species management are all geared towards this purpose.

Farmer Group Development and Strengthening

In the APP Project, a benchmark survey of 675 individuals, including 166 females, in all participating 15 CARIFORUM countries, showed that only 34% of the respondents belonged to farmers groups. Group strengthening was identified as very critical. Capacity-building in group development and strengthening were therefore started.

In Dominica and Haiti, group development/strengthening started for roots and tubers producer groups. The same groups, through other training sessions, became aware of what is involved in maintaining Good Agricultural Practices (GAP).

In St Lucia, the knowledge of the Bellevue Farmers’ Cooperative on agricultural methodologies related to issues of risk and climate change, for roots and tubers and on improved vegetable production under PA systems, was heightened.

In Haiti, emails and flyers were used to inform stakeholders of climate change and its potential consequences for agriculture.

The APP Project also empowered a number of small farmer producer groups to successfully manage the production of sweet potato and cassava planting materials. The groups included the North East Farmers Organisation of Grenada, and Network of Rural Women Producers, Babonneau Rural Women Agro Producers and Trinity Lutheran Church Youth Group Agriculture Project, all of St Lucia.
Skills in Germplasm Management and Production

In Belize, under the IICA/CARDI Cooperative Programme, the know-how for cassava rapid propagation and for improved production systems was imparted to 64 farmers (including 15 females), using CARDI established training materials.

The CARDI Unit in Jamaica, through the Red Stripe Project Grow initiative, trained 66 stakeholders who gained proficiency and certification in cassava production.

Improved knowledge and skills of farmers along the cassava value chain are among the most tangible outcomes under the FAO Cassava project.

Skills in cassava propagation and FFS practices were imparted to approximately 60 farmers, including 18 females in Grenada (26 farmers, including 8 females), Guyana (19 farmers, including 5 females) and Jamaica (18 farmers, including 5 females). Also, as part of the overall capacity building process in Good Agricultural Practices (GAP), seven farmers were trained in soil pH testing, after which the farmers were each presented with soil pH indicator strips for use on their farms.

Capacity Building in Value-adding

Forty-eight bakers and hoteliers in Dominica, Grenada and St Vincent and the Grenadines gained valuable skills in making composite bread and other bakery products from local starchy foods (cassava, sweet potato, dasheen and plantain). The composite bread mix was 40% grated sweet potato or grated cassava and 60% wheat flour. The training was facilitated by the Caribbean Agribusiness Association (CABA). Post-training evaluation and monitoring revealed that participants found the training useful and consumers expressed an interest in these roots and tubers value-added products. Bakers also voiced concerns about availability, price and form of the raw materials needed to produce these products. In Grenada, the registration of a composite cassava bread trademark, “Farmers’ Joy”, was being pursued with the relevant authorities, as the year came to a close. The APP Project supported these value-added training activities.

Capacity Building in Invasive Species Management

In Guyana, 71 plantain farmers from Canal #2, Parika and Mahaica in Regions 3 and 5, gained experience in the integrated management of BSD through FFS practices. The Caribbean Development Bank (CDB) funded, Integrated Disease Management Plan for Black Sigatoka Disease Project facilitated the exercises. The other three countries participating in the Project, Dominica, St Lucia and St Vincent and the Grenadines, gained similar experiences in 2014.
For Caribbean agriculture to achieve its objectives of bringing food and nutrition security and generating and providing wellbeing for the people of the Region, there needs to be a cadre of professional actors and trainers of trainers to drive the process. This will ensure that the requisite technologies and innovations are generated and the know-how for the use of appropriate dissemination tools is available. It is in this context that the CARDI programme of work includes a portfolio to help build the capacities of stakeholders, along the relevant commodity value chains. In 2015, the APP Project, FAO Cassava Project, CFC-CDB Small Ruminant Project and the CDB BSD Project were the vehicles used to build the technical competencies in agricultural professionals and technicians.

**APP Project Building Technical Competencies**

During 25-26 March 2015, the skills in tissue culture protocols and management of quality roots and tubers germplasm were honed in 10 technicians from nine CARIFORUM countries (Antigua and Barbuda, Bahamas, Belize, Dominica, Grenada, St Kitts and Nevis, St Lucia, St Vincent and the Grenadines and Trinidad and Tobago), at a training session in St Vincent and the Grenadines. Trainees were from various Ministries of Agriculture and the University of Belize.

In Jamaica, the knowledge on hot pepper seed production and management was increased in 29 individuals from the Ministry of Agriculture and Fisheries and the Ebony Park Heart Academy, through training by the CARDI Plant Breeder. On 7 December 2015, in Trinidad and Tobago, CARDI and the United States Department of Agriculture (USDA) - Animal and Plant Health Inspection Service (APHIS) hosted a Technical Meeting on the harmonisation of protocols for movement of plant germplasm across the Region for members of the Caribbean Plant Health Directors (CPHD) Forum. The output of a study on the ‘Harmonization of protocols for movement of Plant
Germplasm across the Region’ and the recommended harmonised protocols for the movement of sweet potato, yam, hot pepper, corn, beans and pigeon peas germplasm were reviewed at the meeting. Eleven agricultural professionals attended the Meeting.

FAO Cassava Project Building Technical Competencies

The CARDI Units in Grenada, Guyana and Jamaica facilitated the enhancement of the skills in cassava propagation and FFS practices for approximately 30 extension officers, Grenada (9), Guyana (13) and Jamaica (6).

Through the CARDI Guyana Unit, three agricultural professionals (2 MOA, 1 NAREI) were trained in soil pH testing as part of the overall capacity building process in GAP. The training occurred under the FAO Cassava project.

CFC-CDB Small Ruminant Project Building Technical Competencies

Twelve persons were trained and certified in abattoir operations and animal slaughter practices at the Human Employment and Resource Training Trust (HEART) Training Centre run by the Government of Jamaica, through the support of the CFC-CDB Small Ruminant Project. The Project also enhanced the knowledge and skill of 192 stakeholders from Jamaica and Trinidad and Tobago, in small ruminant breeding, husbandry and meat processing. Also, ten trainers of trainers were certified under this Project. In Trinidad and Tobago, preparation was well advanced for the training of butchers and assistance in marketing. A manual consisting of modules from the Project’s training programmes and other sources was being produced for use in the Caribbean.

CDB BSD Project Building Technical Competencies

In 2015, the CDB BSD Project contracted an expert Plant Pathologist to develop an Integrated Disease Management (IDM) framework for BSD management. The development of the framework, together with the training of stakeholders for its use, constituted the third component of the three-prong approach to developing strategies to combat the dreaded BSD.

A total of 92 stakeholders got insights of the structure and workings of the IDM framework for the BSD management, through a series of workshops conducted in the project countries (Dominica, Guyana, St Lucia and St Vincent and the Grenadines), during August - December 2015. The stakeholders included representatives from the banana companies, Fairtrade International, BSD management personnel, farmers’ organizations, research and development units, the Ministry of Agriculture plant protection and quarantine and extension units and the World University Service Canada (formally, Canadian Hunger Foundation).

The management of Moko disease, Cucumber mosaic virus and nematodes were also addressed in the workshops on the IDM framework for the integrated management of the BSD. Each participant received a training manual and a certificate of participation.

The workshops were favourably received in all four project participating countries. All the participants agreed or strongly agreed, that the information provided in the workshop was valuable and relevant for the integrated disease management of BSD.

Also, under the CDB BSD Project, six technicians attached to the NAREI’s tissue culture laboratory in Guyana were provided with the know-how to multiply tissue culture banana and plantain accessions by Rohan McDonald, Agricultural Officer of the tissue culture laboratory in St Vincent and the Grenadines during two 4-day technical assistance missions.
The Intra-ACP Agriculture Policy Programme strengthened Caribbean ‘climate readiness’ capacity

During April and May 2015, three Caribbean agricultural scientists, Trevorne Douglas (Dominica), Aldaine Gordon (Jamaica) and Ruthvin Harper (St Vincent and the Grenadines), participated in an 8-week training attachment, at the Secretariat of the Pacific Community’s (SPC) Land Resources Division located in Suva, Fiji. The attachment is one of the activities funded under Component 2 of the CARIFORUM Action, under the 10th European Development Fund Agriculture Policy Programme (APP Project). Through the training, the scientists increased their knowledge and skills for root crop germplasm selection and evaluation for tolerance to different climatic conditions (‘climate readiness’). The training was sponsored in furtherance of the objective of the APP Project, to foster cooperation and knowledge sharing between the CARIFORUM and the SPC. Root crops are among the commodities being developed in the Caribbean under the APP Project. The SPC has been identified as a Centre of Excellence in the area of Mitigating the Impact of Climate Change in Root Crops, thus its selection to facilitate the training of these scientists. The scientists are expected to apply the knowledge and skills gained towards the identification and selection of ‘climate ready’ root crops in the Region.
CARDI needs to be adequately empowered before it can fulfill its mandate for agricultural development of the Region. In this section of the CARDI Annual Report 2015, we take a look at some of the institutional structures – systems and infrastructures - that were put in place, the staff skills/capacity enhancement, image enhancement/promotion and more importantly, how we leveraged national, regional, hemispheric and international partnerships for additional resources (financial, technical, material, etc.), that helped us to implement the programme of work.

**Institutional Structures - Systems**

**Registry services**

We developed and implemented a new filing system in 2015, which is in line with the structure of the Medium Term Plan (MTP) and its constituent Strategic Axes. This will enable us to better track documents for the programme of work. It is being used at the Headquarters in Trinidad and Tobago, as well as the Guyana Unit and to some extent CARDI Jamaica Unit. It would be rolled out to the other CARDI Units in phases. We also started the process to garner some external resource funds to fully computerise the Registry System, thus allowing for all documents to be stored digitally. This will involve not only a software upgrade but a hardware upgrade as well.

**Financial Administration**

CARDI’s Accounting Manual was revised to be consistent with the structure of the MTP and the resulting new procedures. An accompanying training manual was developed to be used to train all staff, starting with the finance and accounting staff.

**Monitoring and Evaluation**

Effective and efficient monitoring and evaluation systems are critical to making the Institute accountable to Member States and funding agencies and institutions. We deployed several available tools, such as the logical framework, results matrix and Gantt and Microsoft project management software, to effect these systems.

**Institutional Structures – Infrastructure**

The APP Project assisted us to improve the infrastructure on CARDI field stations to efficiently develop, multiply and conserve crops and small ruminant germplasm, as well as manage and feed small ruminants. Multiplication bins, small tools, equipment and supplies were acquired and facilities refurbished to enhance the germplasm development and multiplication at the CARDI Units in Antigua and Barbuda, Barbados, Belize, Grenada, St Lucia, St Vincent and the Grenadines and Trinidad and Tobago. In particular, in the CARDI Barbados Unit, an infrared thermometer and a forced air oven were acquired to boost the capacity of the CARDI Breeder Seed Unit, to produce quality hot pepper breeder seeds. The infrared thermometer would help in the screening/selection of the mother plants for drought tolerance, while the oven would facilitate the drying of samples for tissue analysis.

The capacity of the CARDI Sam Motta Demonstration and Training Centre (SMDTC) in Jamaica, to produce more quality breeding stock, was augmented with five new pure-bred female Boer stock.

Furthermore, several pieces of equipment and hand tools necessary for the improvement of small ruminant production and feeding systems were purchased for the Barbados, Jamaica and Trinidad and Tobago CARDI Units. These included a chipper shredder, hammer mill, pellet mill and forced air oven and booster pump.
Under the 10th EDF Food Security Project, the CARDI Units in Barbados, Belize, St Kitts and Nevis and Trinidad and Tobago were supplied with Davis weather stations and Davis agricultural modules, together with other complementary equipment to be able to measure agro-meteorological parameters, such as rainfall, ambient temperature, humidity and soil temperature, soil moisture and leaf wetness. The functionality and capacity of the weather measuring instruments were further enhanced with the procurement of a few additional pieces of equipment under the APP Project.

**Dependable deliverer of unique services**

Strengthening CARDI as the research for development institution of choice in CARICOM also means being perceived as a dependable deliverer of unique services by stakeholders and partners. Therefore, the Institute takes every available opportunity to deliver such services.

In the sections under “Building Capacity in Farmers and Rural Agricultural Communities” and “Building Capacity of Regional Agricultural Professionals and Technicians,” we have already highlighted how we moved in tandem with our stakeholders for the common good of the regional agriculture. In addition to these, there were other opportunities, through our Strategic Axis 2, “Development of Strategic Linkages” and Strategic Axis 3, “Institutional strengthening,” for us to advance the interests of our stakeholders.

At the secondary school level, CARDI awards the first-place performer in the Caribbean Secondary Education Certificate (CSEC) Agricultural Science examination for CARICOM countries. The CARDI Agricultural Science Award for Outstanding Performance was given, in 2015, to Jade Francis of Munro College, Jamaica. The stakeholders’ access to agriculture literature/information on CARDI’s priority commodities and thematic areas was facilitated through literature searches and current awareness services by the Information and Communication (IC) Unit.

Information and documents were also delivered in response to 42 requests from stakeholders. Researchers, students and farmers requested information on Black Sigatoka Disease, hot pepper, coconut, avocado, mango, roots and tubers, PA, small ruminants, beef and buffalo. In May 2015, the Jamaica Agricultural Society (JAS) requested publications from CARDI to use in their training of farmers in dasheen and sweet potato production. Copies of “Guide to Producing and Handling Export Quality Dasheen in the OECS” and CARDI’s “Sweet Potato Technical Manual,” were sent to them. Likewise, the Guyana Livestock Development Authority (GLDA) requested bibliographic information on Small Ruminants in the Caribbean and was sent the following bibliographies compiled by CARDI, “Small Ruminants: CARDI Publications, a list of publications on CARDI website” and “Small Ruminants production in the Caribbean - a select bibliography”.

Biometrics services were provided by the CARDI Biometrics Unit to four stakeholder and collaborating institutions – University of the West Indies (UWI), 18 times, University of Trinidad and Tobago (UTT), 1, Ministries of Agriculture and other Ministries, 9 times and the Sugarcane Feeds Centre (SFC), Trinidad, 1.

A manual on biometrics analyses was produced for the Ministry of Agriculture and Natural Resources (MANR), Belize. This manual contains extensive appendices on computer analysis using the GENSTAT® software and can be used for training in the future.

**Face to face**

Our CARDI Open Days are our first formal Face to Face (F2F) interactions point with our stakeholders. In the reporting year, CARDI Open Day was held by all Units, during November 2014 - February 2015, to showcase the Institute’s contribution to meeting food and nutrition security and reducing poverty and hunger.

We also capitalised on national F2F interactions opportunities. The achievements of CARDI were popularised at World Food Day celebrations and at national exhibitions in Antigua and Barbuda (National Trade Expo), Barbados (AgroFest), Belize (National Agriculture and Trade Show), Cayman Islands (48th Agricultural Show)
and Jamaica (Denbigh Agricultural and Industrial Show), and in Trinidad and Tobago at the National Institute of Higher Education, Research, Science and Technology (NIHERST) “T.A.R. into Science” fair.

Traditional media

Stakeholders who could not benefit from our F2F interactions had opportunities through the traditional media to learn about our contributions to the regional efforts towards food and nutrition security. Internally, we published and circulated approximately two dozen issues of the newsletter, "Agriculture in the News: issues affecting Caribbean agriculture" and 15 issues of "CARDI Bi-Weekly: Happenings in CARDI". For the scientific community, we also published Issues 14 and 15 of our internal scientific publication, "CARDI Review."

We leveraged our mutually beneficial partnership with the Association of Caribbean Media Workers (ACM) network for the coverage of our work and achievements. Some of the notable traditional media coverage we received are shown via the hyperlinks below.


Web-enabled tools

Web-enabled tools are useful complements to F2F and Traditional Media for disseminating information and in some cases, they even supersede the former. Since 2013, several CARDI staff members have developed skills in and embraced Web 2.0 tools as the next generation tool for disseminating information on and promoting CARDI. The following are examples of some of the ways we used web-enabled tools to promote the Institute’s work and achievements.

CARDI continued to facilitate the Dgroups for the AFNC, as well as the Research and Development and Human Resource Thematic Group (TG), one of the four TGs developed from the amalgamation of the original nine Technical Management Advisory Committees (TMACs) mandated to remove the Key Binding Constraints of the Jagdeo Initiative.

The CARDI Cayman Islands web page was developed and uploaded and it is accessible from the Home Page of the CARDI website (www.cardi.org).

We maintained current News, Events, Publications and Virtual Library pages on the CARDI website. The CARDI Virtual Library (http://www.cardi.org/cardi-publications/virtual-library), is a repository of e-copies of 455 CARDI publications that are accessible to the public.


Partnerships

The CARDI mantra is, “We cannot do it alone”. The mantra intrinsically embraces partnerships and collaboration as a cornerstone for the Institute to deliver on its mandate. CARDI’s approach to partnerships and collaboration takes different forms, such as bringing together partners to develop R4D strategies, developing new partnerships and renewing existing partnerships in support of CARDI’s mandate, as well as trying to expand the membership base in support of its objectives.

Bringing together partners to develop R4D strategies

The CARDI MTPs and ensuing programmes of work derive from broader regional research for development (R4D) strategies. These strategies are dynamic and continue to evolve and be updated based on regional needs. The continuous development of relevant R4D strategies calls for a strong “working together” approach. This is exemplified in the Agriculture Food and Nutrition Cluster (AFNC).

CARDI chairs the CARICOM AFNC, which aims to harmonise the work of regional institutions engaged in agricultural development and maximise the use of limited resources available. This is a sub group of the CARICOM Secretary General’s grouping of regional institutions, but also includes non-CARICOM institutions such as FAO, IICA, University of Guyana, Caribbean Farmers Network (CaFAN), CABA, CDB and the OECS Secretariat. The foundation CARICOM institution members of the Cluster are: CARDI, CARICOM Secretariat, Caribbean Regional Fisheries Mechanism (CRFM), Caribbean Public Health Agency (CARPHA) and UWI, but other institutes such as Caribbean Institute for Meteorology and Hydrology (CIMH), Caribbean Disaster Emergency Management Agency (CDEMA), Caribbean Examinations Council (CXC), Implementation Agency for Crime and Security (IMPACS) and Caribbean Community Climate Change Centre (5Cs), are invited to contribute to its functioning and deliberations, particularly in areas relevant to their respective mandates. The AFNC reports to COTED.

One of the major efforts of the Cluster in 2015 was the identification of four priority commodities for regional agricultural R4D, namely, cassava and tropical root crops, herbs and spices, small ruminants and fisheries. Each of these commodities has an associated Commodity Group to coordinate and oversee the work in the commodity area and report back to the Cluster. CARDI chairs the Small Ruminant commodity group.

Following a COTED decision, the nine TMACs mandated to remove the Key Binding Constraints of the Jagdeo Initiative was reconfigured into four TGs. One of these is the TG for Research and Human Resource Development (TGRHRD) chaired by CARDI and co-chaired by UWI, which has responsibility for Human Resource Development. These TGs also report to the AFNC. During the year, both the TGs and the Commodity Groups began to identify and catalogue the relevant work areas in the various regional institutions.

Using the National Coordinating Committee for Agricultural Research and Development (NCCARD) mechanism (or similar in-country mechanism), the expertise and knowledge of CARDI scientists were brought to bear on the deliberations and decision making processes of national agricultural policy and R4D institutions. This was particularly prominent in Belize, where the CARDI Representative made useful contributions to the Pesticide Control Board, Biosafety Council, Task Force on Agriculture and Food Policy, Jalacte Outreach Programme, FAQ Cassava Project on agro-processing etc.

In St Lucia, the NCCARD was resuscitated following an agreement among CARDI, IICA and the Ministry of Agriculture.
New partnerships in support of CARDI’s mandate

In 2015, CARDI signed a number of Memorandums of Understanding (MOUs) either on its own accord or under the auspices of CARICOM with the view to fulfilling its mandate. Principal among these were the Institute-initiated MOU with the Yucatan Center for Scientific Research (CICY) and the CARICOM sponsored MOUs with New Zealand and India.

The overall objective of the MOU with CICY is to collaborate on research activities in areas of mutual interest and the commercialisation of appropriate technologies. Under this five-year MOU, both agencies will exchange scientific, academic and technical information on areas of mutual interest, facilitate academic, as well as staff exchanges, identify areas for cooperation and joint research in disciplines of mutual interest and organise and participate in joint scientific and academic seminars and conferences.

The CARICOM Secretariat identified CARDI as the institution responsible for agricultural development under the CARICOM/New Zealand and CARICOM/India agreements.

CARDI signed an operational agreement with the Government of New Zealand to implement a two-year small ruminants project. The emphasis of the project is to build the Region’s capacity in improved husbandry practices and the use of reproductive management tools including artificial insemination and embryo transfer for small ruminants, as well as to establish a suite of robust information and communications technologies (ICTs), required to improve innovation in the small ruminants sector. The latter will be done in collaboration with the Computer Science Department at UWI, St Augustine Campus.

New Zealand project consultant, Chris Asby, in August/September 2015, visited Trinidad and Tobago, St Lucia and Jamaica to engage with key project stakeholders.

Representatives of CARICOM, the government of India and CARDI met to discuss the operationalisation of the agriculture component of the CARICOM/India Agreement. A Brief prepared by CARDI and which identified several potential work areas, was used as the framework for the discussions.

Other new partnership initiatives undertaken in 2015 included MOUs with the Marketing and National Importing Board, Grenada, to facilitate revitalising hot pepper and other commodities in Grenada, which are a part of CARDI’s work programme and Baron Foods Ltd, St. Lucia to help the company expand its range of products, particularly hot pepper sauce and thereby sustain CARDI’s hot pepper industry development agenda.

Renewal of partnerships in support of CARDI’s mandate

On 4 November 2015, CARDI renewed agreements with two key development partners, the Technical Centre for Agricultural and Rural Cooperation (CTA) and the Inter American Institute for Cooperation on Agriculture (IICA).

CARDI and CTA signed a three-year MOU in which both organisations agreed to focus on working together to enhance capacity for relevant, innovative and effective agricultural research and development and
to disseminate technologies and practices that contribute to on-farm, post-harvest, processing and marketing efficiencies. CTA and CARDI also pledged to collaborate in research and documentation of evidence and best practices related to climate-smart agricultural practices and to facilitate the use of modern ICT tools to share and promote information on innovations, markets, and research and development strategies.

CARDI and IICA also renewed their General Technical Cooperation Agreement (GTCA). CARDI and IICA pledged to work together on direct technical cooperation, to improve agricultural production and productivity and build resilience in agriculture, through sustainable and efficient use and management of environmental resources, particularly soil and water and adaptation to climate change variability.

Expansion of membership base in support of CARDI’s mandate

Cayman Islands

The newest CARDI Member State, the Cayman Islands officially opened for business with the installation of Ansari Hosein as the Country Representative (CR), with effect from 29 June 2015. CARDI will work in close collaboration with the Department of Agriculture, Cayman Islands to implement the Institute’s work programme, which will focus on improving production and productivity of roots and tubers, development of feeds and feeding systems for ruminant livestock, commercial production of roots and tubers, protected agriculture systems development and biotechnology development.

The Bahamas

The instruments establishing CARDI in the Bahamas was agreed between CARDI and the Government of the Bahamas. It is expected that the instruments would be ratified and the Bahamas accede to full membership of CARDI in 2016.
CARDI Publications in 2015

CARDI. 2015. Calendar 2016 – an integrated approach to Black Sigatoka Disease management. An output of the CDB funded project "Development of an integrated disease management programme for Black Sigatoka Disease Management"

CARDI. 2015. Sargassum seaweed and its use in crop and livestock production: possible agri-business opportunities. CARDI Policy Brief issue 1. St Augustine, Trinidad and Tobago: Caribbean Agricultural Research and Development Institute
http://www.cardi.org/cardi-publications/virtual-library/?did=635

http://www.cardi.org/cardi-publications/virtual-library/?did=630

doi:10.2134/agronj14.0287
https://dl.sciencesocieties.org/publications/aj/abstracts/107/1/375

Simpson L A and Johnson L. 2015. Technical manual for the production of specific herbal plants in Jamaica. St Augustine, Trinidad and Tobago: Caribbean Agricultural Research and Development Institute

Staff and Organisation

Professional headquarters

**Professional staff**

Chesley, H. Arlington Dr, Executive Director (officially retired 21 August 2015)

Clarke, Barton, Executive Director (Appointed 1 May 2015)

Akedu, Francis Dr, Manager, Technical Services

Glan, Alan, Senior Project Officer

Launder, Bruce, Biometrician/Head Strategic Alliance

Maharaj, Debra, Executive Assistant

Malcolm, Margo, Head, Institutional Capacity Building Unit

Muhammad, Aziz, Value Chain and Marketing Specialist

Morris, Opal, Librarian

Nero, Curtis, Head, Finance Unit

Paul, Compton, Regional Coordinator CFC to 31 Dec 2015

Petersson, John, Consultant 1

Ramkissoon, Rajdaye, Junior Accounting Assistant

Ferguson, Angela, Administrative Secretary

Doksie-Hamis, Rajdaya, Junior Accounting Assistant

**Technical staff**

Abraham-King, Shelley, Accounting Assistant (retirement 21 June 2015)

Achong, Sean, Graduate Assistant (resigned 17 February 2015)

Alvarez, Tristan, Graduate Assistant, RMME

Alvarez, Tristan, Graduate Assistant/IT Coordinator

Bassant, Ramsaran, Senior Information Assistant

Butler, Sharmin, Mail Cleaner

Brathwaite, Latchier, Graduate Assistant/IT Coordinator

Daly-Vire, Cyndi-Anne, Administrative Secretary

Diske-Hamis, Rajdaya, Junior Accounting Assistant

Ramroop, Raveena, Accounting Assistant

Reynolds, Tenesha, Administrative Assistant

Robateau, Leroy, General Farm Worker

Tzib, Cornelio, Technician

Vanegas, Ambrocio, General Farm Worker

**Antigua & Barbuda**

**Professional staff**

Robin, Gregory Dr, Agronomist/CARDI Country Representative

**Technical staff**

Batchelor, Delvin, Technical Assistant

Browne, Bradley, Technical Assistant/Officer in Charge

Bowman, Donnet, Administrative Assistant

**Barbados**

**Professional staff**

Roberts, Cyril Dr, Biotechnologist Breeder/CARDI Country Representative

**Technical staff**

Best, Paul, Field Assistant

Niles, Marca, Administrative Assistant

Walthe, Jennifer, Laboratory Assistant

**Belize**

**Professional staff**

Sinha, Anil, Agronomist/CARDI Country Representative

**Technical staff**

Garcia, Angel, General Farm Worker

Lindo, Martin, Technician

Reyes, Hector, Graduate Assistant

Reynolds, Terri, Administrative Assistant

Robateau, Leroy, General Farm Worker

Tzib, Cornelio, Technician

Vanegas, Ambrocio, General Farm Worker

**Cayman Islands**

**Professional staff**

Hosein, Ansari, Livestock Scientist/CARDI Country Representative

**Technical staff**

Eberne, Dorian, Technician/Officer-in-Charge

Augustus, Dione, Administrative Assistant

**Dominica**

**Professional staff**

Etienne, Dorian, Technician/Officer-in-Charge
Grenada

Professional staff
Andall, Reginald, Agronomist/CARDI Country Representative

Technical staff
Bruno, Janielle, Administrative Assistant
Raymond, Reuben, Field Assistant

Guyana

Technical staff
Alevyne, Dawn, Administrative Assistant
Itwaru, Basdeo, Driver

Jamaica

Professional staff
Simpson, Leslie, Soil Scientist/CARDI Country Representative (Ag.)
Clarke-Harris, Dione, Entomologist
Fearon, Albert, Animal Productionist

Technical staff
Asiedu, Elizabeth, Accounting Assistant
Barnes, Ralston, Technical Assistant
Davis, Winksime, Accounts Clerk (Mandeville)
Gordon-Sangster, Andrea, Secretary
Hanson-Hall, Rasheeda, Graduate Assistant

Montserrat

Technical staff
Murraine, Robert, Technician

St Kitts and Nevis

Professional staff
Thompson, George, CARDI Country Representative

Technical staff
Duvalot, Valet, Administrative Assistant
Brown, Roderic, Field Assistant

St Lucia

Professional staff
Pilgrim, Ronald, Post-Harvest Technologist/CARDI Country Representative

Technical staff
O’Brien, Sharon, Administrative Assistant
Thomas, Jacob, Field Assistant
George, Emmanuel, Research Assistant

St Vincent & the Grenadines

Professional staff
Robin, Gregory Dr, Agronomist/CARDI Country Representative

Technical staff
Joseph, Rose Marie, Technician
Harper, Ruthvin, Samuel, Recander, Administrative Assistant

Trinidad & Tobago

Professional staff
Gibson, Norman, Livestock Scientist/Head Trinidad & Tobago Unit (25 June 2015)
Adams, Herman, Plant Breeder
Minott, Annika Dr, Scientist I

Technical staff
Leith, Hendrickson, Administrative Assistant
Quashie, Selby, Technician
Duchesse, Raquel, Secretary
Ali, Nazir, Field Assistant
Jack, Heidi, Graduate Assistant
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