



Caribbean Agricultural Research and Development Institute (CARDI) and Inter-American Institute for Cooperation on Agriculture (IICA) -Work Plans 2016 and 2017 under the IICA-CARDI General Technical Cooperation Agreement

FINAL REPORT



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Executive Summary

The Caribbean Agricultural Research and Development Institute (CARDI) successfully executed the projects identified under the 2016-2017 agreement with Inter-American Institute for Cooperation on Agriculture (IICA) and as a consequence, registered significant strengthening of its institutional infrastructure (systems, technologies, and people), and increased capacity in germplasm management and in small ruminants' technologies. CARDI staff visited the 5Cs and were introduced to their human resource, financial, scientific and governance systems. This insight has served to help CARDI to identify the bottlenecks within its own operational systems and have allowed us to devise new strategies for the resolution of same. This has led to the development of proposals for the comprehensive revamping of CARDI's operations. This process should initiate and complete in the latter half of 2018.

With respect to germplasm management, the collaboration with CIP in Peru was operationalised to the extent that new capacities were built in our regional scientists in the innovative management of improved sweet potato varieties. The way has also been opened for Caribbean germplasm to be stored at CIP in their germplasm bank. The institute has also initiated the establishment of sweet potato innovation platforms in the Member States as part of its thrust to strengthen networks and linkages among stakeholders. The delivery of distance learning capacity and the deployment of mobile applications to improve the functionality of the small ruminants' industry was enhanced. Regional collaboration among small ruminant stakeholders was also improved through workshops which fed into the work of the Commodity Groups under the Agriculture, Food and Nutrition Cluster. The production of improved hot pepper lines to support regional expansion of this commodity was also undertaken during this reporting period. This work will establish the basis for accelerated seed production to meet the growing demand for hot pepper in the region.

CARDI also made advances in its climate change agenda by facilitating the demonstration of hydroponic systems that minimise water usage. The beneficiary countries included St Kitts, Antigua and Montserrat where stakeholders were exposed to training sessions in the setup and operations of simple hydroponic systems for vegetable production. Quite apart from the execution of the projects, the impact of the collaboration with IICA has led to the identification wider systemic issues which are being addressed by CARDI. Some of these include our readiness to pass the EU Pillar Tests, the need to improve the agility and

robustness of our operational and governance systems and the requirement to establish functional cooperative mechanisms with international agencies. In this regard, the institute is charting a course to deliver the future that we want and to improve sector performance within the Caribbean space. Our partnership with IICA is critical to the successful execution of that mandate.



Flags of CARICOM Member States

1.0 Introduction

Agriculture continues to play a significant role in the economic resilience of the region, generating income; facilitating food supply and food and nutrition sovereignty; contributing to physical and infrastructural development; and reducing poverty and hunger. Agriculture also contributes to employment generation in a region where high levels of unemployment and underemployment remains a challenge. The CARICOM Secretariat together with its Member States and other regional and international stakeholders continue to design, implement and execute policies, programmes and projects to accelerate the development of the sector. Innovation and the resultant increase output in the sector will address the necessary technical, infrastructural and incentive frameworks.

In spite of being endorsed as one of the key drivers to achieving economic prosperity, food and nutrition security and rural development by countries in the Region, the unfortunate reality is that growth of the sector continues to be slow and sometimes uneven. Food imports, as opposed to national food production, are by far the largest source of food for CARICOM populations. CARICOM countries currently import in excess of US\$ 4 billion in food annually, an increase of 50 percent since 2000. Food imports are projected to increase to US \$8-10 billion by 2020 if current efforts are not successful in addressing this problem (FAO, 2015). On average, there have been six natural disasters in the region annually between 1970 and 2006, with higher incidences in Haiti and the Dominican Republic. The active hurricane season of 2004 resulted in damages in the Caribbean amounting to USD 3.1 billion, with catastrophic impacts on the gross domestic product (GDP) of member countries, particularly in Grenada (estimated at 200 percent of GDP). These shocks have serious macroeconomic impacts which have increased the incidence of poverty and could even lead to economic crises in the country.

The Agriculture Sector in particular, has been severely affected, by these weather related and seismic events. Consequently, the region's food and nutrition security has been impacted. These impacts include, inter alia, loss of crops and livestock, reduced agricultural productivity, malnutrition, forest fires, destruction of housing for livestock, increased migration of fish from the region, high food prices and loss of livelihoods of affected farmers and fisher folk. Losses from the active season of 2017 are still being computed but are in the tens of millions of US dollars, with the CARICOM countries of Antigua and Barbuda and Dominica suffering from debilitating economic development setbacks. Investments in research and development is a must and remains the only catalyst for improving agricultural productivity and stimulating economic growth. A

productive regional agricultural sector will boost the food and nutrition status and social well-being of every citizen, reduce the food import bill, promote good environmental stewardship and reverse the worrying trends of chronic Non Communicable Diseases (NCDs).

The Inter-American Institute for Cooperation on Agriculture (IICA) and the Caribbean Agricultural Research and Development Institute (CARDI) share a long standing institutional relationship, started some 20 years ago. Both institutions signed their first collaborative agreement in 1989, a five year Cooperation Agreement to “promote agricultural research and development in the Caribbean.” It was then agreed that a collaborative effort could provide a more effective contribution to agricultural research and development in the Region than could otherwise be achieved by the separate and independent action of each party. Through the technical cooperation agreements over the years, IICA provided CARDI with the resources to conduct research and implement projects in agreed areas. The significance of the interventions are seen through the impact on selected areas including protected agriculture, herb and spices, small ruminants, roots and tubers and information and communication. More recently, IICA-CARDI collaborative interventions have become more strategic and also broader in scope than the stated mandate of research and development, being tailored to the provision of services without which would place regional agricultural development on a longer time horizon.

This Report presents the results of the implementation of the IICA-CARDI Technical Cooperation Agreement 2015-2017 as well as provides recommendations for future collaboration. Notably, the report also considers the wider impact of the constituent projects on the development and transformation of CARDI and its readiness to pass the EU Pillar Tests.

1.1 CARDI in the Caribbean Region

CARDI with its technical expertise, wealth of knowledge, experience, track record and presence in 14 CARICOM Member States is well positioned to coordinate the Region’s agri-food research and development agenda and in so doing deliver on the diverse R&D needs of the Member States. Increasing investment in agricultural research and development as well as strengthening strategic partnerships with key organizations like IICA will result in the development of agriculture innovations including, new varieties, technologies and practices which will stimulate productivity and competitiveness, spur wealth creation, stem the migration of persons out of the sector and fight food and nutrition insecurity.

It is within this context, that CARDI has been pursuing work in a number of strategic areas targeted at the application and adoption of improved technologies based on sound scientific principles and grounded in innovation.

2.0 General Technical Cooperation Agreement (GTCA), 2015 – 2017 IICA-CARDI

The 2015 Agreement continued to support the framework for collaborative technical assistance by the organizations to develop a sustainable agriculture sector in the Region. This continued technical assistance is informed and aligned to a number of approved regional plans and policies including: Jagdeo Initiative and the Liliendaal Declaration for agriculture as mandated in July 2009, the Conference of Heads of Government of CARICOM, the Regional Food and Nutrition Security Policy (RFNSP, 2010) and Action Plan (2011), the CARICOM Community Agricultural Policy (CAP, 2011), the CARICOM Regional Framework for Achieving Development Resilient to Climate Change (2012) and the Strategic Plan for the Caribbean Community 2015-2019.

Both organizations recognize the enormous challenges the Region faces, particularly with regard to increasing the agricultural sector's productivity and competitiveness, enhancing food and nutrition security, improving the management of natural resources, production capacity and understanding the implications of climate change and consequential increased natural disasters. Major threats faced by the Region include: the growing dependence on imported food and the limited capacity of small farmers to supply and compete in both the domestic and external markets and the increasing occurrence of natural disasters. In order to address some of the priority issues, IICA and CARDI acknowledged the need to collaborate in the Region's agricultural sector. This has been and continues to be facilitated through agreed Areas of Cooperation under the General Technical Cooperation Agreement (GTCA). Through this agreement IICA provides technical and financial resources to CARDI which facilitates the implementation of a number of agreed projects to address critical agricultural areas in the Region.

2.1 General Objective

IICA and CARDI will work jointly to address the specific priorities and challenges of the agricultural sector related to research for development and innovation in the Caribbean, including Member States of either IICA or CARDI or both.

2.1.1 Specific Objectives

- To identify, plan and coordinate the implementation of projects and actions of the Work Plans (2016, 2017) that support the resilience and productivity of agricultural production systems
- To support an institutional strengthening program for CARDI inclusive of capacity building in program management and communication that will enhance its strategic role as a regional innovation agent.

3.0 Projects Implemented under the IICA-CARDI GTCA; 2015-2017

During the period 2015 to 2017, with extended time allowed to mid-2018, CARDI implemented 16 projects under the IICA-CARDI GTCA for a total amount of US\$ 400,000. These projects addressed a number of critical priority commodity areas inclusive of:

- Herbs and spices
- Small ruminants
- Climate Change
- Institutional Strengthening
- Germplasm Management
- Rehabilitation and Resilience Programme (Post Hurricanes Interventions)

3.1 Herbs and Spices

3.1.1 Production of First Generation seed of Yellow hot pepper land races

A major challenge is the improvement and stabilization of indigenous hot pepper varieties. Therefore, the project aimed to evaluate and characterize desirable yellow hot pepper land races and to produce first generation seed. Seedlings from five yellow land races which were collected in 2016 were established at a designated plot on a farm in South Trinidad in November 2017. A total of 66 plants were planted in 2 blocks. Irrigation was installed and plants were fertilized accordingly. The first harvest was in October 2017 and then in November 2017. Screens were placed on selected, which were deflowered to allow for self-pollination in fruit development. Self-pollinated berries were harvested in January 2018. Data related to morphological characteristics were recorded for 3 elite lines which showed commercial potential.



3.1.2 *Development of Elite Seed lines of Pimento (Trinidad Seasoning Peppers) land races for commencement of stabilization*

Trinidad Seasoning pepper is characterized by much variability in fruit morphology. Seedling operators and farmers have been requesting pure seeds of Pimento for cultivation. This project aimed to produce elite lines of Pimento Trinidad Seasoning Peppers for commencement of stabilization of the land race. This project experienced significant delays as an alternative location had to be found. CARDI's Demonstration and Training Centre, Goldsborough, Tobago (GDTC) was identified as the new location. A plot was established with seedlings of selections of a cultivar in August 2017. Four of the selections were taken from major growing areas of pimento peppers and two from municipal markets. A total of 1095 plants were established. The plot was managed using an integrated pest management approach including drip irrigation. An assessment of berries were made in October 2017, high performers were identified for exclusion and the generation of self-pollinated seeds. The exclusion operations were conducted in November 2017.



Twelve plants were selected as high performers. Due to extreme weather circumstances in December 2017, a decision was taken to harvest all ripe and physiologically mature berries in January 2018 and seed extracted. It is recommended that a follow up plot be established under the sheltered conditions of the GDTC propagating nursery. Estimated completion date August 2018, no additional cost will be incurred.

3.2 Small Ruminants

3.2.1 *Improving the innovation performance of the regional small ruminants' industry through the application of ICTs*

The project involved regional training in ICTs for stakeholders in the small ruminant sector. Forty-six participants were trained including farmers, extension officers and veterinarians. The emphasis of the training was to introduce and promote CARDI ICT resources developed under the Caribbean Regional Small Ruminants Capacity Building Activity. These include the Moodle based E-Learning Platform to deliver distance teaching/training as well as two Mobile Applications: CARDI SR Learn and CARDI SR Market. The E-Learning Platform allows access to course materials that are focused on aspects of production and management in small ruminants' husbandry and reproductive management. Materials are interactive and in the form of text, photos and videos. The other applications include one that provides access to the E-Learning Platform and one that facilitates trade (e-marketing) in livestock and livestock products by bringing buyers

and sellers together. One server to house the small ruminants' data was purchased, commissioned and is housed at CARDI HQ. Relevant information on the small ruminants' industry has been uploaded to a searchable database. CARDI's ICT infrastructure has been considerably strengthened and apart from this project, will provide a strengthened platform for increased accuracy in project management. This will assist the Institute in its preparations for Pillar Testing. This project has also started to address the issues related to inadequate knowledge management services which are prevalent in the sector.

3.3 Climate Change

3.3.1 Development and conduct of a Climate Change communal training programme

This project involved the design and set up of appropriate hydroponic systems in St. Kitts/Nevis and Montserrat. The project also involved the training of householders at the community level to set up and run simple hydroponic systems for household use and to test and validate hydroponic systems for commercial production of vegetable crops. . Systems were designed and built in both St. Kitts/Nevis and Montserrat. In St. Kitts/Nevis 10 persons were trained however, in Montserrat the project stalled, where the initial work was completed but training was never implemented. In July 2017, 25 persons were trained in hydroponic systems in Antigua. The setback in this project followed the tragic passing of the principal trainer, a young man who was mainly responsible for the designs and the delivery of the training programme. CARDI subsequently engaged a consultant to complete activities on this project.



3.4 Institutional Strengthening

Under the rubric of Institutional Strengthening, CARDI implemented a series of projects to enhance the organisational capacity and capability to deliver on its mandate. The interventions ranged from an in-depth assessment of the organisation, a planning and development meeting to the training of several staff

members and key stakeholders in areas critical to the delivery of our strategic objectives. These interventions are explained in the following sections:

3.4.1 Institutional Review and Strengthening of CARDI

An Institutional Assessment of CARDI was conducted which informed the development of the 2018-2022 Strategic Plan. The plan was rolled out using a series of videos, interviews and stakeholder interactions which provided CARDI with a significant platform for interaction with national and regional participants in the agriculture value chain. This was done against the background of the emergence of a new agriculture in the Region, characterised by imperatives that include CNCDs, Climate Change and Disaster Risk Management. The sector has broadened its scope in spite of increasing challenges which requires increased attention to the various elements of the agriculture innovation system and food value chains including research, inputs, production, investment, trade/marketing and information. Thus there is need for a strong, robust and appropriate research agenda to drive regional innovation in the sector along with the institutional capacity to meet evolving and more stringent demands for Results Based Management (RBM) and realization of impact. In this regard, CARDI recognized that it needed to fundamentally reposition itself as the lead CARICOM agency with responsibility for research and development in the agri-food sector. Hence the Institute conducted a comprehensive review of its existing systems and capabilities to determine if it possessed the requisite resources and direction required to deliver on the new research agenda. Further areas to be strengthened in terms of delivery of its strategic mandate will be highlighted.

During the period December 2016 to April 2017, stakeholder and focus group meetings were held in six countries across the region: Grenada, Trinidad and Tobago (Trinidad), Barbados, Belize, Jamaica and Antigua and Barbuda (Antigua) where interviews were conducted with select CARDI staff members, beneficiaries (individuals or groups benefiting from CARDI interventions) and collaborators/partners of CARDI. Field visits to local experimental stations and tours of CARDI offices were also conducted.

A representative from IICA participated in the final country visit to Antigua. The representative accompanied the consultants as they conducted the stakeholder meetings, met with CARDI staff and visited experimental stations. All reports including Monitoring, Progress and Final Report have been completed and submitted to CARDI.

3.4.2 Strengthening the Capacity of CARDI Staff in Public Relations and Communications

CARDI personnel completed a six months online training course in Social Media Marketing. Upon completion, significant capacity had been built to improve promotion and the communication of the institute's activities and interventions in the sector.

3.4.3 Training of CARDI Staff in Project Management

A 5-day training programme in Project Management was conducted for CARDI's Staff in February 2017. Seventeen staff members were trained in project management. As CARDI increases the number of externally funded projects, the need to strengthen staff capacity to plan, develop, implement and manage these externally funded projects through the application of appropriate project management techniques is indicated.

3.4.4 CARDI Planning Meeting

In October 2017, CARDI held a two day Regional Planning Workshop for its Technical Staff. Forty-two members of staff from CARDI's Regional Offices and HQ attended. The meeting provided a platform for the Executive Director to outline the strategic direction for the organization based on the Strategic Plan 2018-2022. All Units presented their Country Status Reports and Work Programme for the next strategic period. This included existing and new projects in alignment with the strategic direction of CARDI.

3.4.5 CARDI Mission to the Caribbean Community Climate Change Centre (5C)

A team from CARDI, HQ led by the Manager, Science, Technology and Innovation (STI) visited the 5Cs in Belize over the course of three days. The Centre facilitated a critical review of its Financial, Administrative, Technical and Governance systems and provided the Team with valuable insights into its operational structure. This comprehensive assessment of the Centre's managerial and operational systems provided significant institutional strengthening support to CARDI and is now shaping the way the Institute is reforming its internal architecture. The mission proved to be an eye opener as it allowed CARDI to peer into the workings of the only CARICOM organisation that is completely self-reliant in its funding mechanisms. This is the future that CARDI is embracing as our institutional reform gathers pace.

3.5 Germplasm Management

3.5.1 *Building Innovative Capacity in the Regional Sweet Potato Value Chain*

In December 2017, three CARDI Scientists, one scientist from the National System in Barbados and one representative from IICA visited the headquarters of the International Potato Centre (CIP) in Peru for short term training. This was part of an agreement among these institutions to collaborate and provide technical support in the development of a number of germplasm improvement initiatives. This short term training was designed to build the capacity of the visiting scientists in the modern management of sweet potato germplasm and to strengthen the linkages with this International Centre. As a consequence of the visit, CARDI, CIP and IICA will collaborate to store Caribbean germplasm at the CIP facility and to test resilient germplasm from CIP under Caribbean conditions. In this regard, the respective organisations are working together to build a comprehensive germplasm management programme for the Caribbean.



3.5.2 *Innovation Platforms*

Sweet Potato Innovation Platforms (SPIP) were set up in nine countries including: Antigua/Barbuda, Bahamas, Barbados, Belize, Grenada, Guyana, Montserrat, St Kitts/Nevis and St Vincent and the Grenadines.



A wide range of stakeholders participated and are engaged in the wider process of improving the production and productivity of sweet potato in the Caribbean. The constraint that the SPIPs will address among others will be the lack of collaboration and coherence along the sweet potato value chains that currently exist in

the region. The platforms are charged with building innovation capacity within the sector through a systematic process of stakeholder engagement at all levels of the value chain. The essential idea driving the platforms is that the rich diversity of actors engaged in the platform will have an opportunity to consider the various problems confronting the industry and through a deeply collaborative process, arrive at sustainable solutions.

3.6 Rehabilitation and Resilient Programme

3.6.1 *Post Hurricane Intervention*

In the aftermath of the hurricanes which devastated the region in September/October 2017, CARDI and IICA agreed to collaborate on a joint programme of assistance to the affected countries within the framework of the IICA/CARDI Work Plan for 2017, executed under the IICA-CARDI General Technical Cooperation Agreement.

The agricultural sector of Antigua and Barbuda, St. Kitts and Nevis and The Commonwealth of Dominica suffered significant damage with The Commonwealth of Dominica suffering unprecedented devastation, which saw the agriculture sector 100% destroyed. The CARDI/IICA intervention provided immediate to short term technical assistance and material support in the assessment of damage/loss and the rehabilitation of the agricultural sectors in the islands.

Specifically the interventions were designed to:

- support the authorities in the affected countries, through capacity building and specific technical assistance, to accurately assess damage/loss in the agricultural sector using satellite imagery and other tools as a basis for developing short, medium and long term strategies for rebuilding and rehabilitating the agricultural sectors
- assist countries in restoring the productive capacity of the agricultural sector in the short term through the provision of seeds, germplasm and nursery infrastructure to facilitate the restart of food crop production
- assist targeted communities and producer groups to rebuild and rehabilitate productive capacity and reestablish their income flows through the provision of technical assistance and material support.

The IICA-CARDI Post Hurricane Rehabilitation initiatives were designed to complement and supplement other initiatives planned and ongoing in the affected countries with particular reference to initiatives being led by

the respective Government authorities and the OECS Commission. The activities complemented actions executed by the Ministries of Agriculture as well as actions approved by IICA under the Rapid Response Action (RRA) instrument of technical cooperation. The actions also supplemented the ongoing efforts by CARDI to provide seed and rebuild nursery infrastructure amongst other actions as well as those planned by the Food and Agriculture Organisation (FAO). The proposed actions were designed to be executed in the immediate to short term given that the General Technical Cooperation Agreement between IICA and CARDI was initially supposed to end in December 2017, but has since been extended to June 2018.

3.6.2. Damage/Loss Assessment using Satellite Imagery and other advanced tools

The project aimed to conduct a feasibility study on the use of satellite data for assessment of 2017's hurricane period impact on agriculture in Dominica, Antigua and Barbuda, St. Kitts and Nevis. The satellite data were used to quantify the hurricanes' impact on 4 different broad crop groupings.

Training

An introductory course on Satellite observation, GNSS and GIS was conducted with 33 persons spanning different sectors of agriculture inclusive of Extension Officers, Technicians, Biometricians, CARDI's Country Representatives, ICT professionals. Persons were exposed to the different applications of this technology with respect to the different sectors of agriculture.

Satellite Images

Images for St Kitts and Nevis, Dominica and Antigua and Barbuda were generated and the preliminary reports show demarcations of agriculture lands in country post storm events.

Presentation of the results of the feasibility study

At the Caribbean Week of Agriculture (CWA) in October 2018, the results of the study will be presented to persons who are responsible for developing strategies in climate change, Ministers, Permanent Secretaries and other key stakeholders in the agriculture sector across the Caribbean.

Follow up work

Out of the GIS and GNSS training a project to use Drones, GPS and GIS technologies to help with land usage in East Trinidad was formulated.

To commence work on mapping the different crops across the region

3.6.3 Restoring Productive Capacity through Provision of Seed, Germplasm and Nursery Infrastructure

The project involved the procurement and supply of seeds and germplasm and the rebuilding of nursery infrastructure to restore productive capacity in the area of short term crops. The project also strengthened the nursery infrastructure in Dominica.

3.6.4 Provision of technical assistance and material support

Dominica – In March 2018, the Ministry of Agriculture and Fisheries (MOAF) received a cheque for US\$ 21,104.00 (EC\$55,925.60) towards payment of seeds, seedling material, water pumps and accessories acquired in the immediate aftermath of Hurricane Maria. In addition, CARDI in collaboration with IICA worked with the farmers and farmers groups in restoration and rehabilitation efforts. Details of the project are provided in the Minister’s Brief in the Annex.

Antigua/Barbuda - In September 2017, CARDI in collaboration with IICA and other governmental agencies conducted an assessment of the damage post hurricane. Thereafter a series of intervention were planned and implemented in Barbuda. The main areas of intervention included, livestock, apiculture, seeds and planting material, climate resilience and training and capacity building. CARDI assisted in the reconstruction of a major



Greenhouse by Sir Mc. Chesney George Secondary School. Resources were also provided to farmers in particular livestock. CARDI acquired, procured and distributed equipment, materials and supplies to apiculture farmers. In addition procured, transported and distributed fencing material and supplies.

Further, CARDI procured, transported and distributed of animal feed for livestock farmers (small ruminants, poultry and pigs. CARDI facilitated the donation of from a local farmer in Antigua to affected farmers in Barbuda in coordination with the Ministry and private Antiguan Farmers. Details are provided in the Minister’s Brief in the Annex.

St. Kitts/Nevis- A variety of vegetable and fruit seeds and seedling trays were purchased. The Departments of Agriculture in both islands have assumed the responsibility for germinating and distributing the seedlings to farmers. Seedlings were distributed to farmers in three separate disbursements at three month intervals to prevent supply gluts and reduce the potential of wastage. Disbursement of seedlings occurred on December 5/6, 2017 in St. Kitts and Nevis, 20 farmers in St. Kitts and 12 farmers in Nevis benefited. In St. Kitts, CARDI and IICA collaborated to host a workshop on protected agriculture. A total of 20 farmers from Nevis were trained at the workshop.

4.0 Financial Report

Over the period 2015 to 2017 CARDI received US \$400,000 in four tranches, as per the agreed areas of cooperation covered by the 2015-2017 GTCA, namely: Direct Technical Cooperation, Internal Institutional Capacity and Mobilization of Resources. These resources were used to support 6 project areas and implement 16 projects spread over the work plans for 2016 and 2017. Total expenditure over the period is recorded at US \$390,305, the table below presents the details. The balance of US \$9, 695 is committed. Refer to the Table 1 below.

Table 1: Summary Expenditure on project for the period 2016 to 2017

Project Areas	Expenditure US \$
Institutional Strengthening	187,795.68
Climate Change	10,027.83
Small Ruminants	39,745.19
Herbs and Spices	10,242.73
Germplasm Management	27,493.64
Rehabilitation and Resilient Programme	115,000.00
TOTAL	390,305.07

Table 2 below presents the list of projects and the specific allocations for 2016. In 2016, a total of US \$142,829 was expended on the listed projects. However, there was an unspent balance of US \$ 57,171 which was re-allocated and spent on agreed projects in 2017, refer to Tables 2 and 3 below.

Table 2: IICA-CARDI Projects in the Work Plan - 2016

Projects	Budget allocation (US\$)	Country/ies implemented
Production of first generation seed of yellow hot pepper land races	17,700	Trinidad
Development of elite seed lines of Pimento (Trinidad Seasoning Peppers) land races for commencement of stabilization	10,000	Tobago
Development of an App for buyer/seller exchanges and training modules for small ruminant production	15,000	Antigua & Barbuda, Barbados, Trinidad & Tobago
Development and conduct of a Climate Change communal training programme	15,000	St. Kitts, Montserrat
Institutional Review and strengthening of CARDI	101,380	Regional
Strengthening the capacity of CARDI Staff in Public Relations and Communication	1,025	Trinidad
Training of CARDI Staff in Project Management	32,895	Regional
Work Plan Management Actions	7,000	Regional
TOTAL	200,000	

Table 3: IICA-CARDI Projects Revised Work Plan 2016 (Implemented in 2017)

Projects	Revised Budget (2017)	Country/ies Implemented
Production of first generation seed of yellow hot pepper land races	5,200	Trinidad
Development of elite seed lines of Pimento (Trinidad Seasoning Peppers) land races for commencement of stabilization	4,509	Tobago
Building Innovative Capacity in the Regional Sweet Potato Value Chain (Peru)	18,462	Belize, St. Vincent, Trinidad and Peru
Institutional Strengthening – Review of Financial and Human Resource Systems	29,000	Trinidad
TOTAL	57,171	

In 2017, a total of US \$ 199,222 were expended on the identified projects. Refer to Table 4.

Table 4: IICA-CARDI Projects 2017

Projects	Budget (US)	Country/ies Implemented
CARDI – Institutional Strengthening (Phase 2)-Visit to 5 Cs	15,000	Belize
Internal Strategic Planning Meeting for Professional and Technical Staff	24,000	Trinidad
Building Innovative Capacity in the Regional Sweet Potato Value Chain	15,000	Peru
Stakeholder Consultations in Selected CARICOM Countries		Regional
Training in Establishment a Breeding Programme	30,222	Barbados
Two day Regional Meeting		Trinidad
Post Hurricane Intervention	115,000	Dominica, St. Kitts and Antigua/Barbuda
Balance	778	
Total	200,000	

Notably, for the 2017 period was the allocation of US \$115,000 to the post hurricanes interventions. These funds were disbursed to three projects across the impacted islands. Refer to 5 below.

Table 5: IICA – CARDI POST HURRICANE MARIA -2017

PROJECTS	TOTAL COST USD
Damage/Loss Assessment using Satellite Imagery and other advanced tools	25,000
Restoring Productive Capacity through the Provision of Seed, Germplasm and Nursery infrastructure	40,000
Rebuilding and Rehabilitating Productive Capacity of Targeted Communities and Producer Groups	50,000.

5.0 Future IICA-CARDI Collaboration Projects 2018 and beyond

Under the Areas of Cooperation it is proposed that CARDI will continue to work closely with IICA to develop projects to address the current and emerging challenges faced by the region's agriculture sector. In this regard, a number of concepts have been identified for further project development. These include:

5.1 Institutional Strengthening

Continuous **institutional strengthening** by utilizing various methodologies including the facility of Study Visits to key regional organisations that have international accreditation for funds management, capacity building for selected staff and stakeholders in key strategic areas and renewal of the institute's HR, Finance and Procurement systems.

5.2 Regional Small Ruminants; Industry

Accelerated development of the **regional small ruminants' industry** through Capacity Building initiatives for regional stakeholders. The development of breed recognition software that will assist in the identification and scoring of breed types for sale around the region. Upgrade of the current small ruminants' marketing mobile application to reflect the animal health import requirements of participating countries.

5.3 Germplasm Management including movement across the region.

The region needs to continuously invest in safeguarding the germplasm of important food crops in order to build resilience in the agriculture sector. Agrobiodiversity management (conservation, sharing and utilisation) is a critical cog in the wheel of regional food and nutrition security particularly in the context of climate change and other environment risks. Additionally, the threat of war and terrorism related activities cannot be discounted given growing global instability.

The organisations will continue to work together on improving germplasm management, in particular as it relates to **sweet potato** development. Closer collaboration is also anticipated in relation to accelerating the development of the regional **coconuts** industry.

5.4 Climate smart agriculture and resilience.

The need for the adoption of climate smart practices to reduce greenhouse gas emissions and to adopt adaptation measures to build a resilient sector cannot be sufficiently underscored. In this regard, delinking future growth in agriculture from fossil fuels and embracing renewable energy to drive innovation in the sector is necessary for agriculture's sustainability.

5.5 Information and Communications Technology (ICT)

The use of **Information and Communications Technology (ICT)** to drive sector innovation remains a critical area for new investment as it will serve to widen the demographic appeal of the sector and to create goods and services that have true global value.

5.6 South –South Relations

The establishment of **South/South** linkages brokered by IICA will be part of the pathway towards the future development of regional agriculture. In this regard, the relationship with CICY in Mexico, CIP in Peru and other multilateral arrangements with key strategic partners represents part of the future harvest we can expect from working together.

5.7 Herbs and Spices (Hot Pepper)

We also anticipate that in the context of the CARICOM priority commodities, there will be further collaboration in the work towards strengthening the regional **Herbs and Spices (Hot Pepper)** industry.

6.0 Strategic Partnerships

CARDI has engaged and collaborated with many development partners in pursuing the Institute’s mandate over the years and the collaboration with IICA represents one such partnership that has yielded positive results and has supported CARDI in delivering its technical actions.

While this report focuses on actions funded with resources provided by IICA within the framework of the IICA-CARDI General Technical Cooperation Agreement, it should be stressed that IICA and CARDI have over the period 2015 – mid-2018 worked closely together and collaborated on actions which have been funded from other sources.

6.1 National Project Coordination Mechanism

Under the General Technical Corporation Agreement (GTCA), a National Project Coordination Mechanism (NPCM) is established in countries where projects and/or activities are to be executed. The NPCM comprise personnel from both organisations, as well as a representative of the Ministry responsible for Agriculture and a member of the agricultural community. This has been the mechanism used to manage the implementation of the Agriculture Policy Program (APP) and has allowed for the identification and harnessing of synergies among the three components of the program. This mechanism will continue under the IICA/CARDI arrangements going forward.

6.2. Agriculture Policy Program (APP)

The APP was funded by the EU, and CARDI had responsibility for project activities of Component II which included Technology and Research and Development. Activities were conducted in the Member States until

the programme ended in 2016. Under Component II of the Agriculture Policy Program (APP), CARDI had responsibility to:

1. Strengthen capacities of small producers/entrepreneurs including women and youth) to utilize appropriate, sustainable, innovative production systems and technological packages for selected commodities
2. Develop, multiply and distribute quality plant and animal genetic material (imported and indigenous)
3. Improve, disseminate and facilitate the adoption of agricultural production strategies to mitigate the impact of risks and climate change.

CARDI worked with national, regional and international partners to implement component II and as the full report demonstrates, has had considerable success in delivering new knowledge, building innovative capacity and promoting sustainable agricultural development across CARIFORUM. This was principally achieved in collaboration with IICA, CARICOM Secretariat and the various Ministries of Agriculture within the national agricultural research systems.

Overall APP project management was the responsibility of a National Project Coordination Mechanism (NPCM), which was established in countries where projects and/or activities were to be executed. The NPCM comprised personnel from both organizations, as well as a representative of the Ministry responsible for Agriculture and a member of the agricultural community. This has been the mechanism used to manage the implementation of the Agriculture Policy Program (APP) and has allowed for the identification and harnessing of synergies among the three (3) components of the program. This has worked particularly well in Trinidad, where the process was led by the IICA Country Representative in the country. Among other things, the APP succeeded in building capacity in germplasm management, identifying climate resilient food crops of importance to food and nutrition security, demonstrating the efficacy of small machinery in agricultural production, identifying new markets and overall, improving the functioning of value chains across a wide spectrum of the regional agri-foods industry. Critically, it served to build strong collaborative links among several organisations and has served to increase the innovation capacity of the regional agricultural sector.

6.3 International Potato Centre (CIP)

CARDI and IICA continued its institutional relationships with the International Potato Centre (CIP) in Peru, where a tripartite Letter of Intent was signed among CARDI, IICA and CIP in May 2016⁷. Through this letter of intent, the agencies sought to establish lines of communication for further negotiations, consultations



and cooperative processes towards the greater technical and scientific collaboration among the agencies. In December 2017, scientists from CARDI and IICA visited CIP for a short-term training and initial technical collaboration under the tripartite agreement.

6.4 Joint/Collaborative Projects – CIP, CTA

As part of the collaborative agreement going forward, it is anticipated that CARDI and IICA will work together to engage a range of international partners including the International Centres like CIP in Peru and CIAT in Columbia. The enhanced collaboration will also include the CTA in the Netherlands. It is expected that new linkages will be forged with international organisations within the context of resource mobilisation, the development of strategic partnerships, scientific exchanges and joint projects. The current successful model that includes CIP in Peru will be pursued through the establishment of functional MOUs.

6.5 Other Strategic Alliances

CARDI and IICA collaborate closely within the context of several CARICOM institutional arrangements including the Agriculture, Food and Nutrition Cluster (AFNC) and its satellites, the Thematic Groups and Commodity Working Groups. The organisations also work closely together under the rubric of the Caribbean Week of Agriculture and in this regard, has collaborated on several projects that promote regional food and nutrition security, particularly in the context of climate change. IICA is also an observer on the Board of Directors of CARDI and in this position, has provided valuable insights into improving the governance mechanisms of the organisation. The IICA/CARDI linkages are inextricably woven together as both

organisations share a rich history of collaboration, shared concerns and comparative advantages that allow for the delivery of a wide range of technology products and services to the agri-food sector.

7.0 ANNEXES

MINISTER'S BRIEF ANTIGUA AND BARBUDA RECOVERY EFFORTS

Following the passage of Hurricane Irma and the consequent devastation to Barbuda a number of teams were deployed to conduct post disaster assessments. The Ministry of Agriculture Lands Fisheries and Barbuda Affairs (MALFBA), the Inter American Institute for the Cooperation in Agriculture (IICA) and the Caribbean Agricultural Research and Development Institute (CARDI) partnered to conduct a preliminary assessment for agriculture in Barbuda; this occurred on September 27th, 2018. It documented the losses which occurred to farmers and their investments. A short list was compiled to indicate the priority areas for action in Barbuda and ways in which farmers in Barbuda would be supported. A request was made by the Permanent Secretary Colin O'Keiffe to access funds through the CARDI/ IICA agreement to assist the MALFBA with the rehabilitation efforts for Barbuda. CARDI in partnership with IICA and the MALFBA confronted crucial components for the revival of agriculture in Barbuda:

- ❖ **Livestock Industry** – Small ruminant farmers received fencing material and animal feed. The fencing material allowed farmers to secure their animals which were threatened by the feral dogs. Pig farmers were given animal feed for both their adults and piglets. Poultry farmers were provided with poultry rations. In total \$2550 US or \$6885 EC was spent on animal feed and distributed to farmers in Barbuda. Fencing materials and supplies amounted to US \$4200 or \$11 340 EC and included posts, wire, nails and staples. Four female black belly sheep and six male black head sheep were organized for Barbuda under the CARDI IICA Rehabilitation efforts.
- ❖ **Apiculture** – The bee industry in Barbuda was identified as a priority area with a strong potential to rebuild and to become a thriving industry. As it pertains to these efforts CARDI acquired US \$5600 or \$15120 in bee keeping supplies for the rehabilitation efforts in Barbuda.
- ❖ **Irrigation** – In developing a more resilient agricultural sector for Barbuda CARDI acquired US \$2650 or \$7155 EC in irrigation lines and supplies. The CARDI team also identified a demonstration plot, forage bank, for small farmers to train farmers about the use of the drip system in managing forage banks.
- ❖ **Seeds and Planting Material** – Planting material for the establishment of a forage bank was provided to improve the resilience of livestock farmers in Barbuda. Mulberry (*Morus spp.*), guinea grass (*Megathyrsus maximus*), green panic (*panicum maximum var. trichoglume*), chrysopogonaciculatus and elephant grass/napier grass (*Pennisetum purpureum*) were harvested for Barbuda to demonstrate the advantages of using these systems and rapidly multiplying the material for livestock farmers. A total of \$9325 US or \$25, 1775 EC was spent on seeds and planting material for Barbuda.
- ❖ **Training and Capacity building** - Twenty five farmers directly benefitted from the resources and the technical support provided through the CARDI/ IICA Rehabilitation efforts which included practical exercises. Students from the Sir Mc Chesney George Secondary School were given the opportunity to receive practical training and be involved in the process of developing the hydroponic system for the school.

CARDI continues to forge strong *partnerships and strategic alliances* with MALFBA, IICA, NGOs, farmers and youth with respect to the recovery efforts in Barbuda understanding that unity is strength and to rebuild requires a strong commitment.



Figure 1: CARDI/IICA Presentation to the Honourable Arthur Nibbs and the Permanent Secretary Mr. Colin O'Keiffe accepting on behalf along with the team with MALFBA.



Figure 2: CARDI representative for Antigua and Barbuda making a presentation to livestock farmers at the Sir Mc Chesney George Secondary School.

DOMINICA'S BRIEF

Following the passage of Hurricane Maria, reports from on the ground indicated that agriculture was totally destroyed. The Caribbean Disaster Emergency Management Agency (CDEMA) who led CARICOM's response reported severe damage to farm housing, irrigation, infrastructure, feeder roads, forest reserves, coastal fisheries and widespread loss of poultry. For Dominica, this was significant since at least 25% of the population directly depend on agriculture for their livelihoods.

CARDI has partnered with the Ministry of Agriculture and Fisheries (MOAF) and the IICA to assist in rebuilding Dominica's ravaged agriculture sector. Emphasis has been placed on providing short term relief to kick-start agricultural production. By restoring agricultural productivity on the island, livelihoods will be sustained and the dependency on food aid in the less affected communities will be reduced.

In the immediate aftermath of Hurricane Maria, CARDI and IICA representatives conducted a needs assessment of farmers' groups and associations across the island. The assessment yielded useful baseline data which helped inform the needs and type of support these groups required under the IICA/CARDI Technical Framework.

More than 300 persons from the Belles Farmers Cooperative, Cochrane United Farmers Group, Bee Keepers Association, SOUL Multi-Purpose Cooperative, North East Women in Action, the Warner Farmers Group and the 4H Club received agro chemicals, apiary materials, farm tools and equipment, irrigation items and material for livestock housing and fencing material. The value of these farming inputs totaled USD 21,500.

Funding to the tune of US\$21,104 was also provided to the MOAF to purchase seeds, nursery material irrigation and nursery supplies from the OECS.

Tree crops were not spared from the wrath of Hurricane Maria. More than 90% of coconuts in Dominica were reportedly destroyed. Following a request from the MOAF, CARDI under the the EU-funded project, Coconut Industry Development for the Caribbean, will supply 10,000 seednuts and 10,000 tissue culture plantlets to assist in re-establishing 250 acres of waternuts and 250 acres of coconuts for processing. These planting materials are expected to be on island by the end of May.



