CARIBBEAN AGRICULTURAL RESEARCH AND DEVELOPMENT INSTITUTE (CARDI)

CARDI's REPORT

January to December 2014

presented by

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at

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IICA/CARDI COOPERATION AGREEMENT

INTRODUCTION

The IICA-CARDI institutional collaboration started in 1989 when both institutions signed a five-year Cooperation Agreement to "promote agricultural research and development in the Caribbean". Both organizations realized that a collaborative effort could provide a more effective contribution to agricultural research and development in their common Member States than could otherwise be achieved by the separate and independent action of each party. To date, five Cooperation Agreements have been signed by the two Institutes IICA and CARDI; the most recent one being in 2010. This new Agreement seeks to support the Region's agricultural and rural sectors, consistent with the Jagdeo Initiative and the Liliendaal Declaration for agriculture as mandated in July 2009 by the Conference of Heads of Government of CARICOM. These mandates recognize agriculture as a major economic driver in the regional development agenda, particularly with respect to ameliorating food and nutrition security constraints, poverty and hunger and increasing the sector's competitiveness.

Both IICA and CARDI recognize the enormous challenges that the Caribbean 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. A major threat faced by the Region is its growing dependence on imported food and the limited capacity of small farmers to supply and compete in both the domestic and external markets.

In recognition of the need to work jointly to address some priorities of the Region's agricultural sector, IICA and CARDI have developed a collaborative programme (see figure 1) for the period, 2011-2014, to provide technical cooperation and assistance to the Region.

This report provides an update on the status of implementation of the IICA-CARDI Cooperation Agreement. For ease of reference, the format of the report uses the same framework (described below) as that of the programme, which indicates the main areas in which joint projects and actions are executed.

COMPONENTS OF THE IICA/CARDI COLLABORATION PROGRAMME 2011-2014

This programme, which has six (6) components, was developed in accordance with Resolution 464 of the IABA of October 2010 and is presented in Figure 1 (page 17).

Component 1: Facilitate CARDI –Latin Institutional Linkages

CARDI continued its institutional relationships with the International Potato Centre (CIP), Corporation CLAYUCA (Latin American and Caribbean Consortium to Support Research and Development of Cassava) and Center for Tropical Agriculture (CIAT). Negotiations are ongoing with Brazilian Agricultural Research Corporation (EMBRAPA). In addition, CARDI has received support from IICA for the Forum for the Americas on Agricultural Research and Technology Development (FORAGRO) relationship. There has been no professional attachment programme in 2014.

Component 2: Establish Network System for Science, Technology and Innovation

Technology and Innovation Specialist, Dr. Humberto Gomez, has been appointed and is based in the Trinidad and Tobago Office of IICA. He has been interfacing with CARDI particularly on the implementation of Component 5, the current IICA/CARDI Agreement and the technology and innovation inputs for the Intra-ACP Agricultural Policy Programme (APP).

Component 3: Develop synergies with ongoing Projects

a. *IICA – CARDI Collaborations*. IICA and CARDI have partnered on projects, such as, the IICA-CARDI Media Awards for Excellence in Agricultural Journalism, in conjunction with the The Technical Centre for Agricultural and Rural Cooperation (CTA). This was the first Regional event of its kind and was held at the Caribbean Week of Agriculture (CWA) 2014 in Suriname. Previously, it was only hosted nationally in Trinidad and Tobago.

b. *Intra ACP Agriculture Policy Programme (EU funded).* IICA is the Implementing Agency for this programme which has a total cost to the Caribbean of € 8.6m. The three (3) Components include:

i. Policy: managed by CARICOM Secretariat
ii. Technology: managed by CARDI
iii. Agribusiness: managed by IICA

IICA has been facilitating implementation of this programme in countries where there are no CARDI Offices, such as, The Bahamas, Dominican Republic, Haiti and Suriname. IICA and CARDI are members of both the Programme Steering Committee and the Technical Advisory Committee for the implementation of this programme and have collaborated in the development of the Annual Work Plans and other operational mechanisms. There are cross-cutting areas, such as value-added processes, in which IICA and CARDI have initiated work.

Component 4: DG's Competitive Fund for Technical Cooperation (Fon TC)

CARDI agreed to work with IICA in the Eastern Caribbean States on a project on Climate Change. CARDI has participated in one Workshop held in the Dominican Republic in April 2013. No significant activity in 2014.

Component 5: Current IICA/CARDI Agreement

Within the IICA/CARDI Agreement, there is commitment by IICA to provide US$200,000 per year to CARDI, primarily for joint projects. These funds are used to support six (6) areas of priority as seen in the table below. The allocation from IICA to CARDI is managed by a Steering Committee with representatives from both CARDI and IICA. For the period 2011-2014, CARDI has received US$800,000, and as per Agreement.

The distribution of this amount for the 2011-2014 period, plus the balance of funds from the previous period is shown below.

	Thematic Areas	**Amount (US$)**
1	Herbs, condiments and beverages	103,603
2	Protected Agriculture	117,129
3	Root Crops(Starches)	173,208
4	Livestock	177,124
5	Knowledge sharing, Coordination and Management	309,171
6	Cereal and Grain Legumes	24,550
	TOTAL	**US$ 904,785**

Component 6: Access External Resources for Joint Projects

There has been no significant activity in this area. A project proposal entitled "Mexican Government Support to Protected Agriculture" was prepared by IICA with some inputs by CARDI. In addition, prior to the design of a Protected Agriculture structure in St. Lucia, CARDI provided agro-meteorological data which was collected at its field station. The project is being implemented by IICA and the Government of St. Lucia.

PROJECTS AND THEIR CONTRIBUTIONS -2014

The activities and results of the joint projects under the IICA/CARDI Cooperation Agreement for each thematic area are presented in the Table on page 5. It provides the necessary details by country, and in cases where it is regional, it is so indicated.

COMPLETED PROJECTS		
Thematic Area/ Country	**Results and Contributions**	**Beneficiaries**
B. Protected Agriculture		
St. Lucia (transferred from Dominica)	The objective of this project is to determine the most suitable potting media for PA production. Three vegetable crops were evaluated under a semi-enclosed PA structure, including: cucumber (Tropic Q), sweet pepper (King Arthur) and tomato (Heat Master). Treatments included Coconut coir, Coconut coir + river sand (1:1 Ratio), Peat moss, Peat moss + River sand (1:1 ratio) and Soil (control). Crop management practices were performed and data on pH of media, temperature and yield were collected. The pH of the media were as follows: Peat moss (6.9), Peat moss & sand (6.8), Coconut Coir (6.9), Coconut Coir & sand (6.8), Soil (5.2). The mean temperature and relative humidity were 29.3 ^{0}C and 80.1% respectively. Mean weight of cucumber harvested/Plant (kg) for the various treatments were: Peat moss 0.88 Peat moss + river sand 0.16 Coco coir 0.33 Coco coir + river sand 0.21 Soil 0.57 Mean weight of sweet pepper harvested/Plant (kg) for the various treatments were: Peat moss 1.28 Peat moss + river sand 1.08 Coco coir 0.82 Coco coir + river sand 1.07 Soil 0.60 Mean weight of tomatoes harvested/Plant (kg) for the various treatments were: Peat moss 1.01 Peat moss + river sand 1.38 Coco coir 0.56 Coco coir + river sand 0.84 Soil 1.42 The results, after one cropping cycle, indicated that peat moss produced better yield results compared to the other growth media under the semi-enclosed PA production system. For tomatoes specifically, peat moss + river sand yielded good results. A second evaluation trial will be done in 2015.	Direct - Producers, Agro-processors, Hospitality industry Indirect - Ministry Agriculture, Exporters (fresh produce)
ONGOING PROJECTS		

Technical Area/ Country	Results and Contributions	Beneficiaries
A. Herbs, Condiments & Beverages		
Trinidad & Tobago	The objective of this project is to determine the level of nitrogen that will provide optimal shadon beni production. CARDI's on-going research is the optimization of crop nutrition and cost of production (in collaboration with IICA and the Ministry of Food Production). Results of nitrogen nutrition studies have shown that the rate of nitrogen fertilizer applied by farmers for Shadon beni production (260 lb/ac) could be reduced by 40%. Estimation of profitability of Shado beni production from nine farmers showed an average gross profit of TT$1.34/lb. Evaluation trials are ongoing and conclusive results will be reported in 2015-2016.	Direct - Producers Indirect - Ministry of Food Production, exporters, consumers.
Jamaica	A Final Draft of the Technical Manual of agronomic and post-harvest practices of five herbal crops (lemongrass, spearmint, peppermint, cerasee, sorrel) is completed. The chapters include, the history, origin and geographic distribution, botany, nutrition content and uses, nursery, agronomy, postharvest handling, drying and storage. Five hundred copies will be printed. E-copies will be made available on the CARDI and IICA websites.	Direct - Producers, Agro-processors Indirect - Regional Ministries of Agriculture, Scientific Research Council, Jamaica
St. Lucia	The objectives of this project are to conduct an appraisal on factors affecting the performance of ginger production in St. Lucia and to increase local ginger production by the application of improved production practices. A survey of the performance of ginger production and the related cost of production was completed in October 2014. Data are being analysed. A draft improved production tech-pack was developed in November 2014. On-station demonstration plot was established to evaluate this draft tech-pack. Based on the results, the tech-pack will be finalized. Thereafter, on-farm validation of the improved ginger production tech-pack will be done during 2015-2016 period.	Direct - Producers Indirect - Exporters and Agro-Processors
Grenada and St. Lucia	The objectives of this project are to improve the market environment between hot pepper producers and buyers and to facilitate increased hot pepper productivity and coordinate increased hot pepper production, thereby contributing to revitalizing of viable Hot Pepper industries in Grenada and St. Lucia. A Consultation session was held with farmers and Baron Foods in St. Lucia and Grenada. CARDI and BARON Foods signed a Memorandum of Understanding (MOU) with the agreement that Baron will provide a ready market and CARDI will provide the technical support to at least five farmers. A price of ECD 1.52/lb fresh weight was negotiated. Samples of pepper from St. Lucia were also sent to National Canners Ltd in Trinidad and Tobago. A one day Sensitization Workshop and two farmer field training sessions is planned for May 2015 to discuss the elements of the risk mitigating production systems.	Direct - Producers, Agro-Processors (Baron Foods) Indirect - Exporters

COMPLETED PROJECTS		
Thematic Area/ Country	**Results and Contributions**	**Beneficiaries**
B. Protected Agriculture		
Guyana	The objective of this project is to develop a comprehensive package on technological and management options for protected agriculture in Guyana and disseminate the techpacks. The crops being evaluated include lettuce, celery, parsley, pakchoi and poi. The experimental design was completed and the site to construct the PA structure identified. The PA structure was procured and is being constructed. Planting will start in 2015 when the PA structure construction is completed.	Direct - PA Producers, Agro-processors, Indirect - Ministry Agriculture, NAREI
St. Kitts & Nevis	The objective of this project is to build capacity for Protected Agriculture technology and increase the awareness of its use for the production of vegetables for the local market. The PA structure has been procured and construction is in progress. The comparison of production/productivity using the shade house for tomatoes and sweet peppers versus open field will start in 2015 when the PA structure construction is completed.	Direct - PA Producers, Agro-processors, Hospitality industry Indirect - Ministry Agriculture
C. Root Crops (Starches)		
Antigua & Barbuda	The objective of this project is to photo-document and describe the morphological characteristics of at least 32 of the most commonly grown sweet potato accessions in Antigua and Barbuda. Forty two (42) accessions of sweet potato were collected and characterized. Morphological characterization / photo-documentation (IPGR descriptors and photo) have been completed on each of the 42 accessions. Posters have been developed showing the characterization. Validation done on first season production technologies with respect to the performance of nine selected market tested sweet potato varieties. Effects of seasonal planting also evaluated. The conclusions from the two-year evaluations were that varieties, planting season and agro-ecological zones influenced yield. “Catch Me” and “Hurricane” gave highest marketable yields. Highest marketable yields were also obtained from the January and the October plantings compared with April and July plantings; and crops at Cades Bay and Green Castle yielded higher than at Betty’s Hope.	Direct - Ministry of Agriculture, farmers Indirect - Marketers, Agro-processors
St. Kitts & Nevis	The objective of this project is to reduce the incidence of the sweet potato weevil *Cylas formicarius.* In 2010, studies established that the use of pheromone traps was an effective means of managing the sweet potato weevil. However, farmers have been reluctant to adopt the technology because in their view, the traps attract more weevils from outlying fields. Therefore, trials with chemical pesticides were initiated to test their effectiveness in managing the sweet potato weevils. During the period 2011-2013, three experiments were established to evaluate the use of *Beauvaria bassiana* (fungus that grows	Direct - Producers, Agro-processors Indirect - Hotels, restaurants, Supermarkets,

<table>
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<tr><td></td><td>naturally in soils) along with two low risk chemicals (Pronto® and Caprid®) in the control of the sweet potato weevil. When the three trials were compared, it was evident that plots on which Caprid and Pronto were used to control the weevil produced more marketable sweet potato tubers than those with Beauvaria bassiana. Further evaluations will be conducted in 2015 using the same treatments to determine grub damage versus weevil damage before conducting on farm validation trials.</td><td>Ministry of Agriculture</td></tr>
<tr><td>Grenada</td><td>The objective of this project is to contribute to increased production of locally produced sweet potatoes and cassava that will increase the amount available for direct consumption and production of value added products. Seven sweet potato varieties known to have performed well in other parts of the Region were introduced from St Vincent and the Grenadines, including (i) AVRDC CR 1517-139, (ii) AVRDC – Crisio, (iii) CARDI Big Red, (iv) CIPRO 150, (v) Papota, (vi) Unknown and (vii) Viola. The results of the evaluation indicated that The results of the two trials indicated that of introduced varieties, AVRDC-CR 1517-139 and AVRDC CRISIO have proven to be the highest yielding.

Variety — Mean yield/plant (kg)
AVRDC CR 1517-139 — 5.05
AVRDC – Crisio — 4.28
Unknown — 2.99
CIPRO 150 — 2.80
Viola — 2.05

The varieties AVRDC CRISIO and AVRDC-CR 1517-139 were then evaluated with the local varieties, including (i) Reggie and (ii) Toco. The results are shown below.

Variety — Mean yield/plant (kg)
AVRDC – Crisio — 4.77
AVRDC CR 1517-139 — 4.35
Reggie — 4.20
Toco — 2.06

The results of the two trials indicated that the two introduced varieties, AVRDC CRISIO and AVRDC-CR 1517-139 have proven to be the highest yielding of the other introduced and local varieties and very suited to local conditions. On farm validation will be done in 2015. Cassava work will begin in 2015. However, identifying market/value added opportunities is of priority for cassava in</td><td>Direct – Farmers and Ministry of Agriculture

Indirect - Marketers, Agro-processors</td></tr>
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<tr><td></td><td>Grenada since the current production efforts can produce sufficient quantities with the local varieties.</td><td></td></tr>
<tr><td>St. Kitts & Nevis</td><td>The objective of this project is to determine the most suitable sweet potato and cassava varieties for value addition in St Kitts and Nevis so as to result in increased production and use of these varieties. Six sweet potato varieties were evaluated during the period 2012-2013 including: Viola, Clarke, Lover's Name, AVRDC, Black Vine, Never Miss. Three cassava varieties were also evaluated, namely: CM 3306-4, Guyana sweet, Green stem. After harvesting samples were sent for physio-chemical analyses which was done at the Food Science laboratory at the University of the West Indies (UWI), Trinidad and Tobago. The sweet potato results below indicated that Viola had the most moisture and correspondingly lowest fibre content. Black Vine had the least moisture content and highest swelling property. Black vine, therefore, was the most suitable for frying and flour production.

<u>Sweet Potato Results</u>

<table>
<tr><th>Variety</th><th>Moisture %</th><th>Protein %</th><th>Fat%</th><th>Ash %</th><th>CHO %</th><th>Total %Fibre</th><th>Vit C mg/100g</th></tr>
<tr><td>AVRDC</td><td>36.2</td><td>1.0</td><td>0.3</td><td>1.5</td><td>61.1</td><td>3.6</td><td>1.3</td></tr>
<tr><td>Black Vine</td><td>28.5</td><td>1.4</td><td>0.6</td><td>2.6</td><td>67.0</td><td>3.4</td><td>4.0</td></tr>
<tr><td>Viola</td><td>44.0</td><td>1.2</td><td>0.2</td><td>1.5</td><td>53.1</td><td>1.5</td><td>1.8</td></tr>
<tr><td>Clarke</td><td>33.6</td><td>1.4</td><td>0.3</td><td>2.0</td><td>62.7</td><td>4.4</td><td>5.5</td></tr>
</table>

The cassava results indicated that CM 3306-4 were best suited for fries, crisps, bread, and possibly thickener; Green stem for cakes, cookies as well as bread and Guyana sweet for crisps and fries.

<u>Cassava Results</u>

<table>
<tr><th>Variety</th><th>Moisture %</th><th>Protein %</th><th>Fat%</th><th>Ash %</th><th>CHO %</th><th>Total %Fibre</th><th>Vit C mg/100g</th></tr>
<tr><td>CM 3306-4</td><td>4.98</td><td>1.36</td><td>0.79</td><td>2.11</td><td>90.70</td><td>0.68</td><td>9.80</td></tr>
<tr><td>Guyana Sweet</td><td>4.79</td><td>1.36</td><td>0.96</td><td>0.77</td><td>92.11</td><td>1.36</td><td>8.16</td></tr>
<tr><td>Green stem</td><td>5.12</td><td>1.18</td><td>1.12</td><td>1.10</td><td>91.90</td><td>0.81</td><td>3.42</td></tr>
</table>
</td><td>Direct – Farmers and Agro-processors

Indirect - Ministry of Agriculture, Marketers</td></tr>
</table>

COMPLETED PROJECTS		
Thematic Area/ Country	**Results and Contributions**	**Beneficiaries**
Regional (Barbados, Belize, Dominica, Grenada, and St. Vincent and the Grenadines)	The objective of this project is to identify new/ improved cultivars of sweet potato and cassava, develop value added products and strengthen capacity and capabilities of roots and tuber processors in processing techniques, food safety systems, and prerequisites. In Barbados, Belize, Dominica and Grenada, work in progress includes multiplication, field establishment and evaluation of high yielding sweet potato and cassava varieties from SVG. <u>Barbados</u> Cassava varieties (9) - MCol 22, CM 3306-4 and BRA 383, Butterstick, Sugarloaf, WSWR 1, WSWR 2, RSWR 1 and RSWR2 <u>Dominica</u> Sweet potato varieties (2) - Beauregard and Viola Cassava varieties (1) - CM 3306-4 <u>Belize</u> and <u>Grenada</u> Cassava varieties (11) - CM 2166-6, CM 2766-5, CM 2563-5, CM 2766-3, CM 3110-8, CM 5253-1, CM 7596-5, CM 7086-13, CM 6740-7, CM 4919-1, CM 7514-8 and SM 667-1. Sweet potato varieties (2) - Beauregard and Lovers Name Selected and validated sweet potato varieties will undergo organoleptic testing for consumer acceptability. Following the testing, the supply to agro processors with raw material (sweet potato) for processing will be done. In <u>St. Vincent and the Grenadines</u>, in terms of cooked (boiled) sweet potato, 90% of the respondents in the organoleptic tests preferred the CARDI Big Red, 40% Lovers Name, 25% Black vine and Viola. In terms of crisps, Lovers Name and Beuregard were the preferred varieties. Twenty five (25) participants trained in new innovations and concepts with respect to their processing operations. 17 cassava and 3 sweet potato processors were trained in Good Manufacturing Practises (GMPs) and Improved Packaging Practices.	Direct - Farmers and Agro-processors Indirect - Ministries of Agriculture, CABA
Bahamas	The objective of this project is to obtain and evaluate planting material from improved varieties of sweet potato and cassava and to train farmers in Good Agricultural Practises (GAPs) and make planting materials accessible to them. A survey on the current varieties being grown on islands around The Bahamas was conducted. Sweet potato and cassava varieties for evaluation have been identified and ordered from the SVG tissue culture laboratory. The experimental design has been develop and the location identified. Waiting for the planting materials to be imported. Training in weaning and handling of RT material for the project manager will be done in 2015.	Direct - Farmers and Agro-processors Indirect - Ministry of Agriculture

COMPLETED PROJECTS		
Thematic Area/ Country	**Results and Contributions**	**Beneficiaries**
Regional (Antigua /Barbuda, Dominica, Grenada, Montserrat, St. Kitts / Nevis, St. Lucia, Trinidad and Tobago)	The objective of this project is to develop and improve, distribution and weaning and hardening skills of technicians in the Eastern Caribbean States (ECS) (especially countries without Tissue Culture Labs) in weaning and hardening of Tissue Culture root and tuber crops planting material. The aim is to have at least five CARDI and 10 Ministry of Agriculture technicians trained and capable of conducting weaning and hardening of TC roots and tuber crops plantlets pre and post distribution and at least two owners of weaning and hardening facilities in each project country provided with recommendations on best technologies for the weaning and hardening process. This will training will be conducted in 2015.	Direct - CARDI TC technicians Indirect - Ministry of Agriculture
D. Livestock		
Grenada	The objective of this project is to expand the goat milk and goat milk products industry through the upscale and continuous assessment of validated results from the previous housing trials linked to the production of goat milk and milk products. This work builds on improved housing, feeding systems and husbandry practices demonstrated on pilot farms. Ten dairy goat farmers were identified and the houses modified. A baseline survey to ascertain monthly dairy goat production levels before the improvement to the housing design was conducted during October 2013 to September 2014. The data showed that the average monthly milk production was 43 litres. All houses were modified except for one farmer who opted out of the project. Technical guidance was provided by CARDI and the MOA to the farmers. Post housing modification data to be collected and analysed. First aid kits were supplied to the farmers as part of the housing upgrade.	Direct - Farmers, Indirect - Ministry of Agriculture, processors
Regional	Forages for small ruminant production are being assessed especially in Jamaica and Trinidad and Tobago. In Jamaica, the trial investigated promising forage species on the mined-out bauxite lands where the nutrient levels are marginal and moisture content is limited. The trial was conceptualized to investigate how the selected forage types would stand up to grazing, their ability to recover during the grazing cycle and the performance of weaner goats on the selected forage types. The forage types that showed promise in terms of agronomic performance, and nutrient content were African Star grass (*Cynodon nlemfuensis*), Tifton 85 (*Cynodon dactylon*), Mulato (*Brachiaria brizantha* x *B. ruziziensis*) and Pangola (*Digitaria decumbens*). The trial was conducted over two different growing seasons. Over the period of the trial, the animals did not exhibit any negative effect that could be related to the forage diet that they were exposed to. The results indicated that the animals were responding better to the African star and Pangola, respectively, in terms of average weight gains over the two trial periods.	Direct - Producers, Ministry of Agriculture Indirect - Agro-processors

COMPLETED PROJECTS		
Thematic Area/ Country	**Results and Contributions**	**Beneficiaries**
	Item — **Av. Daily Weight Gain (g)** African Star — 62.50 Pangola — 59.00 Tifton 85 — 54.20 Mulato 1 — 37.60 In terms of recovery height, African Star and Mulato 1 performed well. The dry matter content of the African star, Tifton and Pangola were comparable; but Mulato forage was lower. **Item** — **Recovery Height (cm)** — **Dry Matter (%)** African Star — 66.25 — 33.06 Tifton 85 — 52.50 — 37.89 Pangola — 45.12 — 34.04 Mulato 1 — 64.88 — 25.31 In Trinidad, the project sought to determine the effect of Tanner and Mulato II forage species on the growth rate of sheep and determine the cost/benefit. Mulato II and Tanner grasses were established on farm on two 0.4 ha plots (mutton producer, goat milk producer) and at the Sugarcane Feeds Centre. Each block was subdivided and harvested in such a way as to ensure that material being fed to animals was between 6-8 weeks old. The forage was cut into 1-3 inches sizes was using a forage chopper manufactured by Cremasco. The results indicated that by day 42, animals being fed on Mulato II only and Tanner only were found to be losing weight and those treatments ceased. This suggests that neither Mulato II nor Tanner grasses only, when chopped to 1-3" and used in a zero grazing sysem, can satisfy the nutrient and energy needs of growing sheep on their own. Animals fed Mulato II and concentrate feed showed a significantly higher ADG (48.41 g) than those fed Tanner grass and concentrate feed (23.02 g). This trial has shown that Mulato II species performs better than the commonly used Tanner grass in terms of both agronomic and animal performance, when managed properly and is well adapted to the conditions in Trinidad and Tobago. Four twining legumes have been identified including: *Canavalia brasiliensis* (Canavalia)*; Arachis pintoi* (Forage peanut); *Stylosanthes guianensis* (Stylo); and *Pueraria phaseoloides* (Kudzu). This trial was delayed because of challenges in obtaining an import permit for Canavalia and Forage peanut. Sourcing seeds of	

COMPLETED PROJECTS		
Thematic Area/ Country	**Results and Contributions**	**Beneficiaries**
	Tropical Alfalfa to replace the 2 sp. above. Legume trials to continue in 2015.	
Barbados	The objective of this project is to evaluate the production of Mulberry using Good Agricultural Practises (GAPs) and to reduce the time taken from planting Mulberry to first harvest. On-station evaluation of Mulberry using GAPs will be established on a one acre plot in 2015. This improved production systems will be demonstrated to at least 25 farmers for cultivating Mulberry as high protein forage to feed hair sheep.	Direct - Producers, Indirect - Ministry of Agriculture
Suriname	The objectives of this project are to investigate anaerobic digestion as an effective and sustainable manure management system for the control of pathogens in small ruminants, introduce technologies such as probiotics to improve feed efficiency in the small ruminants sector and to investigate the effects of probiotics on biogas production and survival of pathogens from the manure. A polyethylene plastic bio-digester model has been identified and procured (more cost effective). Installation of the Model bio-digester on farm will begin in 2015. The probiotics to be used have been identified, namely, *Lactobacillus* and *Bifidobacteria.* Production of the two probiotics and evaluation of the performance of the probiotics on the growth weight of animals will be done in 2015.	Direct - Producers, Indirect - Ministry of Agriculture
Trinidad and Tobago	The objective of this project is to develop a forage-based feeding system for the local small ruminants industry. On-farm agronomic evaluation of selected species will start in 2015 due to difficulty in obtaining seeds. On-station and on farm feeding trial to determine the effect of combinations of *Leucaena leucocephala, Trichantera gigantean, Morus alba* and Mulato II (*Brachiaria* hybrid) on the growth rate of sheep will also commence in 2015.	Direct - Producers, Indirect - Ministry of Agriculture
E. Knowledge sharing, Coordination and Management		
Trinidad & Tobago	The objective of this project is to increase the coverage and scope of the agricultural journalism awards competition and encourage an increase in the range of stories and features on agriculture in the local media. In 2014, IICA/CARDI hosted a Regional Media Awards, which included Trinidad and Tobago. Winners of the categories for best print; television; and monologue, were selected and presented with an award at the Caribbean Week of Agriculture (CWA) 2014 in Suriname. All winning articles were placed on the CARDI and IICA TT website.	Direct - Civil society organizations, Journalists Indirect - Ministry of Agriculture, Agriculture sector
Trinidad & Tobago	The objective of this project is to disseminate appropriate information to extension officers, research officers, farmer groups and other stakeholders on the conduct of Farmer Field School (FFS) in the Region. The Consultant's Final Report was submitted in June 2011 along with the video recordings. A Manual (user friendly) which will include lessons learnt was developed. The artwork and layout for the packages (pouch containing inserts for the DVD and Manual)	Direct - farmers, Ministries of Agriculture

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<tr><td></td><td>are being done. All approved documentation was sent to the Permanent Secretary of the Ministry of Food Production, Land and Marine Affairs in April 2013. The Minister's Foreword to include in the Manual is still pending. Reproduction of both DVDs and the Manual will commence thereafter.</td><td></td></tr>
<tr><td>Regional</td><td>Co-ordination and monitoring and evaluation of the IICA-CARDI Programme is ongoing. Implemented new project documents/monitoring tools such as the (a) Expected Results Profile; (b) Implementation Schedules; (c) Pro-forma Cash Flow Statements and (d) Logical Frameworks for each new as well as ongoing project. Also, implemented improved reporting templates and biannual internal review meetings within the Project Implementation Unit (PIU) to assess technical and financial progress. Also, facilitated M&E country visits by technical personnel.</td><td>IICA and CARDI and collaborative partnerships with the Ministries of Agriculture, stakeholder Agencies</td></tr>
<tr><td colspan="3">F. Cereals and grain legumes</td></tr>
<tr><td>Grenada</td><td>The objective of this project is to increase the availability of corn supply in Grenada through the evaluation of suitable open pollinated corn varieties. The four open pollinated varieties introduced from USA performed poorly under the local conditions as all were severely affected by rust disease. The Open Pollinated (OP) yellow corn variety from Belize, CARDI YC 001 was evaluated and yielded positive results. Other germplasm of open pollinated accessions were sourced from Belize and the International Maize and Wheat Improvement Center (CIMMYT) in Mexico to compare and evaluate which is best adapted for the Region's conditions. Trials were conducted in 2013-2014. The results, as seen below, indicated that accessions S07TLYNHGAB01 produced the highest mean seed weight. The other varieties that had the highest second, third and fourth mean seed weight were S11TLWNHGAB05, S11TLYNHGAB04 and S11TLYNHGAB02. These four varieties performed significantly better than the CARDI YC-001 variety (from Belize). On farm validation will take place in 2015.

Variety — Seed weight (kg)
S07TLYNHGAB01 — 2.31
S11TLWNHGAB05 — 2.26
S11TLYNHGAB04 — 2.11
S11TLYNHGAB02 — 1.98
S11TLWNHGAB08 — 1.81
S11TLYNHGAB03 — 1.75
S03TLW3HGB — 1.74
S06TLWQHGAB02 — 1.68
S11TLWNHGAB06 — 1.64
YC-001 — 1.63
S11TLWNHGAB03 — 1.26
S11TLYNHGAB01CARDI– — 1.44</td><td>Direct - farmers, Ministries of Agriculture</td></tr>
</table>

COMPLETED PROJECTS		
Thematic Area/ Country	**Results and Contributions**	**Beneficiaries**
Guyana	The objective of this project is to develop cost effective, improved Urea Deep Placement (UDP) of rice and Fertilizer Deep Placement (FDP) of vegetable production systems and to heighten awareness among producers, technicians/scientists and other stakeholders. The minimum tiller and briquette placer have been identified. Procurement will be done in 2015. Two small scale experimental trials of a mechanised UDP production system on rice - one on station and the other one on a farmer's field, as well as, two small scale plots on mechanised FDP production system on eggplant; one on station and the other on a farmer's field will be conducted in 2015.	Direct - Ministry of Agriculture, farmers Indirect - Countries of region (food security)
G. Invasive Species		
Trinidad and Tobago	The objective of this project is to support the rejuvenation and sustainability of the Coconut Industry in Trinidad and Tobago through the safeguarding the industry from the entry of the Lethal Yellowing Disease. Activities to be undertaken in 2015 include: Conduct a survey and perform laboratory testing for the prevalence of Lethal Yellowing (LY) Disease in T&T; Build capacity of personnel within the Ministry of Food Production, Crop Protection Division, in the detection, diagnosis and control of LYD and Develop post-entry surveillance and management systems for the LYD in T&T. A Consultant is being identified to undertake this work.	Direct - Ministry of Agriculture, farmers Indirect - Countries of region (food security)

FIGURE 1
STRUCTURE OF THE IICA-CARDI COLLABORATION PROGRAMME
2011-2014