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Policies and developmental initiatives required to strengthen the Roots and Tubers (RT) and Protected Agriculture (PA) Industries in the Caribbean

TECHNICAL REPORT

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- *An output of the CFC/EU-financed projects: "Increased Production of Root and Tuber Crops in the Caribbean through the Introduction of Improved Marketing and Production Technologies" and "Increased Production of Vegetables and Herbs through the use of Protected Agriculture in the Caribbean" being implemented by CARDI in Barbados, Dominica, Haiti, Jamaica, St. Vincent & the Grenadines and, Trinidad & Tobago.*

Abstract

The value chain approach to industry development in the Agricultural Sector has become the standard by which agricultural investment is evaluated (Hoffler and Maingi, 2005; Mitchell et al, 2009). This approach has enabled the assessment of dynamic or non-discrete variables to be factored into the evaluation of the production chain. Roots and Tubers (RT) and, more recently, Protected Agriculture (PA) for vegetables and herbs, are very important to the region as contributors to the economy of many countries. The Caribbean Agricultural Research and Development Institute (CARDI) has been mandated by the Regional Transformation Programme to spearhead industry development of both RT and PA Industries. Two projects financed by the Common Fund for Commodities (CFC) in collaboration with the European Union (EU) are being implemented (2010-2013) by the CARDI in Barbados, Dominica, Haiti, Jamaica, St. Vincent & the Grenadines and, Trinidad & Tobago, and have so far made significant interventions along the value chains of both industries.

This paper outlines the approach taken to strengthen the PA Value Chain by making targeted interventions where weaknesses were identified. The results so far have indicated that there has been an increase in economic benefits within the RT Industry as a result of the interventions in Dominica, Jamaica, St Vincent & the Grenadines and, Trinidad & Tobago. On-going interventions along the PA value chain in Haiti, Jamaica and, Trinidad & Tobago, are still to be assessed for their technical and economic effectiveness. It is recommended that the interventions be taken beyond the development of static mapping and include more in-depth analyses to provide information to support decision-making at the level of policy and resource deployment.

1. Introduction

With respect to the RT Industry, CFC in collaboration with the European Union (CFC,2009) and, in Agreement with CARDI as the Project Execution Agency, has invested in infrastructure in value-added operations, validated Integrated Crop Management technologies, propagation of quality planting material, group formation/strengthening and, training in primary production and food safety practices along the value chain. These activities during 2010-2013 have been targeted to

specific stakeholders in six countries, namely, Barbados, Dominica, Haiti, Jamaica, St. Vincent & the Grenadines and, Trinidad & Tobago.

The CFC/EU-financed PA project, also being executed by CARDI, targets the establishment of improved PA systems for selected vegetables and herbs, product marketing and trading linkages, the promotion and strengthening of producer and cluster groups working in PA, training of PA stakeholders in the PA sector and, improving access and information on PA to all stakeholders. This project is being executed (2010-2013) in Haiti, Jamaica and, Trinidad & Tobago.

In the CARDI Medium Term Plan (MTP - 2009), Agricultural Industry Development is fashioned according to the value chain approach where all stakeholders are involved in the process as shown by the Commodity Development Chain depicted in Fig 1. The illustrated value chain, taken from the CARDI MTP, is used to describe most agricultural related systems showing the movement of a crop from policy development, through research and development, processing, marketing, and finally, to the consumer. This value chain approach has proven to be successful in creating a sustainable and market-driven agricultural economy (Devanney, 2006).

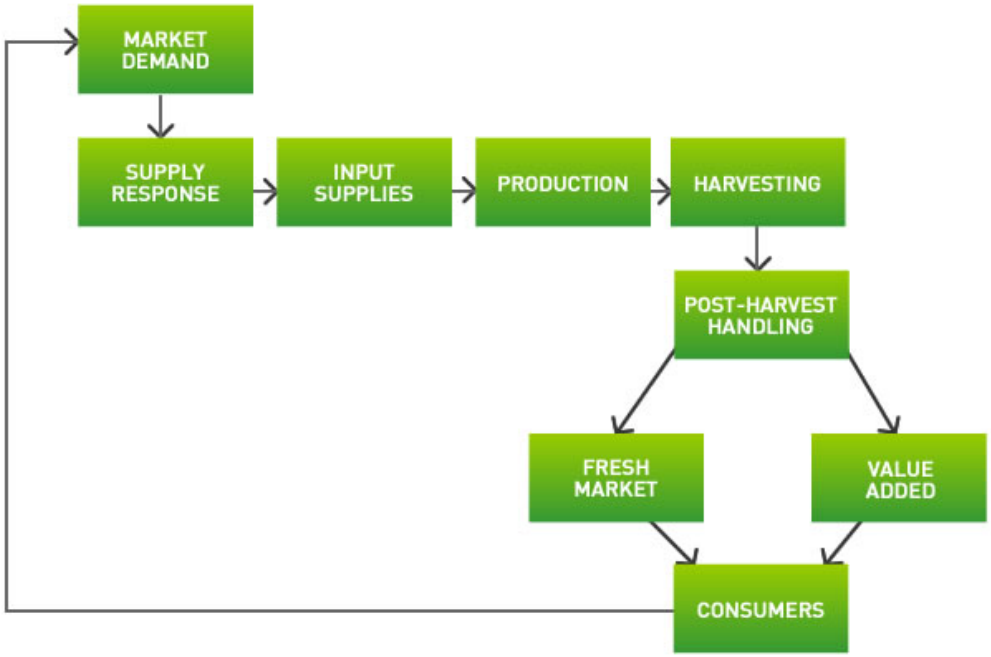


FIGURE 1. Schematic commodity value chain

2. Current status of the Roots and Tubers industry in the Caribbean Region

The United Nations Food and Agriculture Organization (FAO,2006) stated that the importance of roots and tubers is not duly recognized at the global level and, as a consequence, there is little reliable information and statistics on the extent of their cultivation, yield, production, marketing,

storage, and, utilization. The estimation of root and tuber crop yield and production in mixed cropping systems normally used by smallholders is notoriously difficult. Harvesting may be done piecemeal according to household and local market requirements.

In the Caribbean, the demographics of the farming communities fit the same profile of many other developing countries, that is, production is characterised by relatively low yields, a large number of small farms (< 2 hectares), inconsistent quality of produce, inadequate infrastructure, limited market information and distribution channels and fragmented, disorganized farmer groups, all of which do not facilitate industry development. Additionally, the marketing systems are disorganised with weak producer groups and long distribution channels that are inefficient with large post-harvest losses. These factors, combined with the use of poor quality planting material, produce an unsustainable value chain for these commodities. Also, the regional agricultural sector is being influenced by the global factors of price and availability of grains and cereals. Regional agencies, concerned about this trend, signal concerns by several strategic interventions. CARICOM and some countries set a target (25%) for reduction of imports.

However, given the growing importance of roots and tubers (cassava, sweet potato) for food, feed and biofuel (cassava in particular) and increasing awareness of these commodities as a "health food", they are now best placed to realize their potential. Strategic repositioning of Roots and Tubers in the Agriculture sector of the region is, therefore, necessary to foster economic growth.

3. Current status of the Protected Agriculture industry in the Caribbean Region

In common with the RT industry, the PA industry is characterized by a small number of single unit producers, inconsistent quality and supply of produce, inadequate infrastructure, limited market information and distribution channels and fragmented, disorganized farmer groups and consumers that are largely price driven, all of which do not facilitate industry development.

In addition, the regional PA sector is being influenced by the ability of traders to easily import Vegetables and Herbs from areas where the technological hurdles to PA have largely been solved and there exists a pool of well-qualified technicians that have the ability to manage their facilities at optimum levels.

The Jamaican and Trinidad & Tobago markets for fresh vegetables is presently disorganized and lacks proper marketing infrastructure, as well as an adequate market intelligence service. The market is dominated by a few importers of agricultural produce and a large number of small middlemen/traders who collect produce from all over the country for resale to the roadside stalls and supermarket chains. Major retailers, as well as food service purchasers, have expressed dissatisfaction with the ad-hoc arrangement of purchasing from several small middlemen, as the supply of produce is characterized by inconsistency in quality, unreliable supply and widely fluctuating prices.

Produce traded by middlemen is poorly packaged and transported, invariably in open-top pick-ups and trucks while the produce traded by importers are of more consistent supply, attractively packaged and, delivered in refrigerated trucks.

Constraints to PA production include:

- Limited knowledge and skills of producers
- Inadequate technical support
- Inadequate and inappropriate management practices
- Poor record-keeping
- Heavy reliance on costly imported inputs
- Inconsistent supply and variable quality of produce.

Production of vegetables under PA systems in CARICOM countries of the Caribbean requires a strategic repositioning for PA produce in the agriculture sector so as to foster its development since the current consumer attitude does not differentiate PA produce from that of open field produced vegetables which has a completely different cost structure and value chain profile.

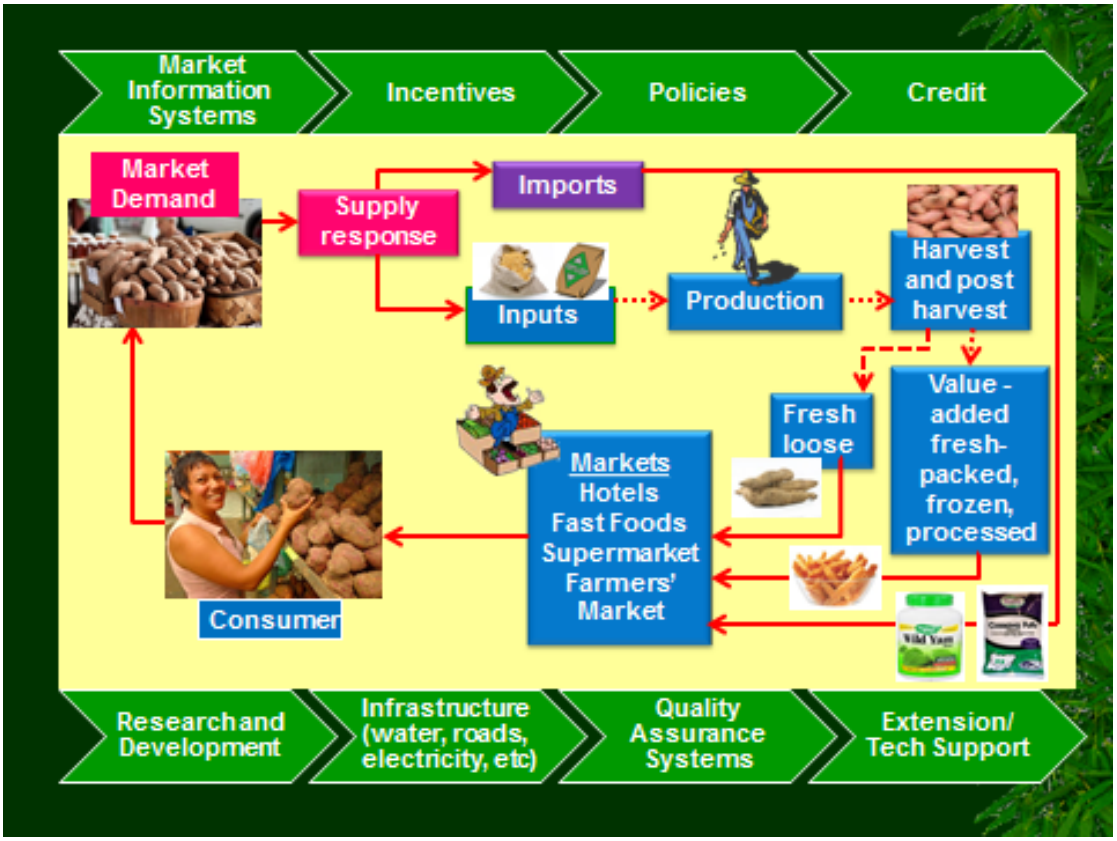
4. Methodology used to define the Value Chains

A value chain can be defined (FAO, 2006, 2007) as the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final customers, and final disposal after use. The chain actors who actually transact a particular product as it moves through the value chain include input (e.g. seed suppliers), farmers, traders, processors, transporters, wholesalers, retailers and final consumers. The value chains are useful for:

- Gaining an understanding of the various steps involved in the production and marketing of the commodities.
- Identifying constraints and possible solutions at different levels in the value chain.
- Identifying the various actors and their impact at each link of the chain.
- Understanding of the processes and the networks/groups/clusters involved better analysis of their interdependency along the value chain.

In the present projects, value chain maps (FAO, 2006; Purcell et al, 2008) were determined by following the development of the commodities as the production processes were initiated and noting the actors that impacted on the development pathways through the chains all the way to the consumer. Information was collected from relevant stakeholders, from the public and private sectors, as well as from individual producers, processors and marketers. The links were developed on the basis of traditional production practices and ended with the purchase by consumers of fresh and processed products (flour, chips, fries, cassava bread, cassava bammy and, cassava farine). Several surveys were conducted in local and national markets since it was found that value-added products are gaining importance in the region; the projects (especially the RT project) have placed an emphasis on development through improved infrastructure, training of processors, product development and, the employment of food safety measures. Value chain maps for the RT and PA industries in Haiti, Jamaica and Trinidad & Tobago are shown in Figures 2 and 3.

Figure 2. Value Chain for roots and tubers in CARICOM countries of the Caribbean.



Important Stakeholders along the RT Value Chain:

Jamaica

Ministry of Agriculture and Fisheries, Rural Agricultural Development Authority (RADA), CARDI, Christiana Potato Growers Cooperative Association (CPGCA), University of the West Indies (UWI), Inter-American Institute for Cooperation on Agriculture (IICA), Scientific Research Council (SRC), several input suppliers, independent producers, hotels, restaurants and, supermarkets.

Trinidad & Tobago

Ministry of Food Production, UWI, CARDI, University of Trinidad & Tobago (UTT), Trinidad & Tobago Agribusiness Association (TTABA), Agricultural Society of Trinidad & Tobago,(ASTT), producer groups (Rio Claro, Cunupia, Tobago), IICA, National Agricultural Marketing and Development Corporation (NAMDEVCO), several input suppliers, independent producers and processors, hotels, restaurants and, supermarkets.

Haiti

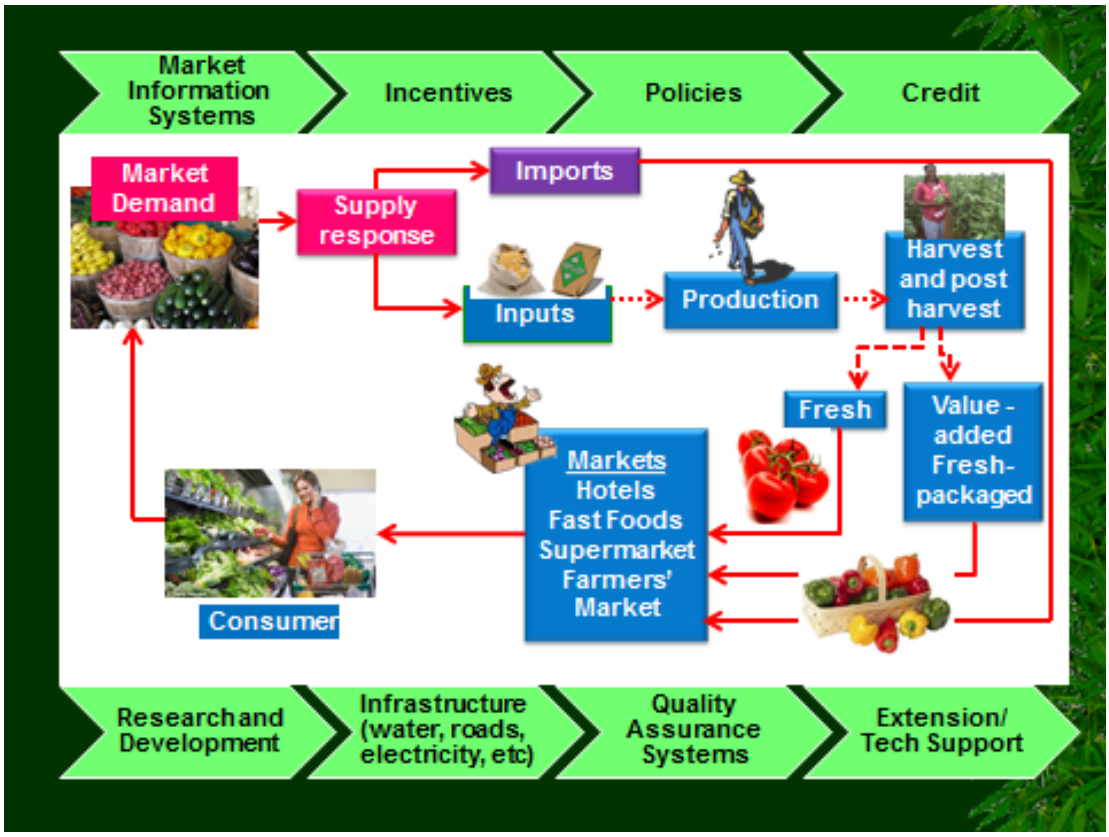
Ministère de l'Agriculture, des Resources Naturelles et du Développement Rural (MARNDR), IICA, CARDI, University National of Haiti, several input suppliers, independent producers and processors, hotels, restaurants and, supermarkets.

Dominica

Ministry of Agriculture, Dominica Export and Import Agency, CARDI, IICA, UWI, several input suppliers, independent producers and processors, hotels, restaurants and, supermarkets.

St. Vincent & the Grenadines
Ministry of Agriculture, Forestry and Fisheries, CARDI, IICA, UWI, several input suppliers, independent producers and processors, hotels, restaurants and, supermarkets.

Figure 3. Value Chain for Protected Agriculture vegetables and herbs in CARICOM countries of the Caribbean.



Important Stakeholders along the PA Value Chain:
Jamaica
Ministry of Agriculture and Fisheries, RADA, Jamaica Greenhouse Growers Association (JGGA), CARDI, CPGCA, UWI, IICA, USAID-Jamaica Farmers Access to Regional Markets (JA Farm), several input suppliers, independent producers, hotels, restaurants and, supermarkets.

Trinidad & Tobago
Ministry of Food Production, UWI, CARDI, UTT, PCS Nitrogen, REPSOL, Trinidad & Tobago Greenhouse Operators Association (TTTGOA), IICA, NAMDEVCO, several input suppliers, independent producers, hotels, restaurants and, supermarkets.

Haiti
Ministère de l'Agriculture, des Resources Naturelles et du Développement Rural, Francois Benoit, Jardin Hydroponiques d'Haiti, Fermathe, CARDI, University National of Haiti, Double Harvest,

PRIMA – EU, MARChe, CNFA-USAID Market Chain Enhancement Project, Oxfam Quebec, Haitian Canadian Chamber of Commerce and Industry, Inter-American Development Bank.

"One key to successful strategic repositioning of a technology or commodity is recognizing that success involves innovative change and requires advocacy, capacity building and marketing" CTA and FARA (2011). It is felt that in the Caribbean context, this could be achieved for the RT and PA Industries by the collaboration of the various stakeholders to formulate and implement strategies which will result in the strengthening of value chains and repositioning of the Industries within the agriculture sector.

5. Results achieved in Industry Development initiatives under the CFC/EU-financed Roots and Tubers (RT) project

(i) Fresh and value-added products development

- Assistance in business development and links to processors
- Good Agricultural Practices (GAPs) training of producers (marketing record keeping, growth and development of crop, propagation techniques, crop care, harvest and postharvest, food safety management systems).
- Infrastructure development to value-added operators (processors).

(ii) Strengthening existing production groups and the formation of clusters along the value chain

- Group strengthening exercises (industry needs assessment, strategic/action/business plans, admin/accounting practices developed with groups of producers/processors of cassava, sweet potato and, yam. All producer groups assisted with marketing links to processors.

(iii) Increasing competence of producers, processors and marketers along the value chain

- Integrated Crop Management (ICM) training in land preparation, crop establishment & care, yam trellising, Integrated Pest Management (IPM), harvest/post-harvest, food safety, marketing and, business development.
- Good Manufacturing Practices (GMPs)/Hazard Analysis of Critical Control Points (HACCP) training and food safety gap analyses of processing industries.
- Training videos and techpacks prepared on sweet potato, cassava and yam.
- The numbers of producers, processors and technicians trained along the RT value chain in the six project countries (Jamaica, Trinidad & Tobago, Haiti, St. Vincent, Dominica, Barbados) are summarized in Table 1.

Table 1. Summary of the numbers of producers, processors and technicians trained along the RT value chain in the six project countries (Jamaica, Trinidad & Tobago, Haiti, St. Vincent, Dominica, Barbados).

Countries	GAPs/ICM	GMPs	Microprop -agation	Total
Jamaica	393	62	4	459
T&T	200	218	3	421
Haiti	51	19	5	75
Dominica	250	30	1	281
St. Vincent	250	25	-	275
Barbados	-	-	1	1
Total	1144	354	14	1512

(iv) Production and distribution of high quality planting materials of cassava, sweet potato and yam through the establishment of appropriate propagation facilities

- Tissue culture laboratory constructed/refurbished in Jamaica and St. Vincent.
- Hardening facilities constructed in all project countries.
- *In situ* collections of sweet potato, cassava and yam varieties maintained in Government/private (germplasm banks).
- Collection, introduction, multiplication, distribution and demonstration of yield potential of quality planting material.
- Training of technicians in germplasm collection, conservation/maintenance and, micropagation techniques.
- Laboratory facilities upgraded to test planting materials for virus diseases at regional level.

(v) Promoting the adoption of technological innovations to solidify the value chain

- Improvement of access, dissemination and, diffusion of information and knowledge to stakeholders along the RT value chain in the Caribbean Region through development of website, databases, videos, technical publications, etc.
- Technicians trained in website and database management.

6. Results achieved in Industry Development initiatives under the CFC/EU-financed Protected Agriculture (PA) project

(i) Improved PA systems for selected vegetables (sweet pepper, tomato, lettuce) and herbs

- PA infrastructure developed in various agroecological zones and used as demonstration sites for training in PA systems.

(ii) Promotion and strengthening of producer and cluster groups

- Strengthening of producer groups and clusters belonging to national PA associations in aspects of group dynamics, time management, business planning, strategic planning, marketing and, GAPs needs assessment.
- Assistance in development of PA databases.

(iii) Training along the value chain

- A total of 405 stakeholders trained in PA system (208 T&T; 157 Jamaica; 40 Haiti). Training topics included: Structural design and management, seedlings and crop establishment, crop care, growth media and plant nutrition, fertigation systems, managing the greenhouse environment, pest and disease management, water management, harvesting and post-harvest operations, marketing and, business management.

(iv) Marketing

- Market profiles developed.
- Pilot project developed linking producers to market.
- Product standards developed.
- Information databases developed to determine market supply, demands and trends.
- Economic analyses including cost of production, profitability and livelihood systems

(v) Improved information sources and access

- Improvement of access, dissemination and, diffusion of information and knowledge to stakeholders along the RT value chain in the Caribbean Region through development of website, databases, videos, technical publications, etc.
- Technicians trained in website and database management.

7. Policy Initiatives required to strengthen the Roots and Tubers (RT) and Protected Agriculture (PA) Industries in the Caribbean

- Legal and policy frameworks for RT and PA Industry development.
- Formation/strengthening of cohesive national and regional RT and PA associations will be mutually beneficial for all the stakeholders from public and private sectors. Representatives from all groups involved in the value chains should meet to review their strengths and weaknesses and develop joint strategies for Industry development. Policies that support the continuous development/strengthening of groups and clusters will be necessary.
- Research and development to provide appropriate technologies (GAPs, ICM practices, GMPs, post-harvest practices, value-added product development) as well as extension services to assist growers, processors and marketers operating along the value chains.
- Marketing and trading infrastructure and intelligence systems that support business development, competitiveness, pricing policies, consumer preferences, and import/export concerns. Identification of market opportunities, market differentiation and branding of products.
- Quality Assurance systems and quarantine regulations.

- Varietal development, multiplication and distribution; germplasm sharing among countries and Institutions.
- Financial support (credit, subsidies, incentives) to stakeholders.
- Infrastructure, transport, communication and distribution channels must be improved which will call for political intervention and possibly private sector investment.
- Information systems and training programmes in support of increased knowledge and skills of stakeholders.

8. Lessons learnt

- The industry value chains analyses should have been conducted sooner after the projects' start-up to facilitate better targeting and impact assessment of the interventions.
- It is recognised that there are still a number of issues that need to be addressed at the various links of the value chains in order to fully develop the RT and PA Industries in the region. For example, the operations of the propagation facilities established in the project countries will require additional financing and qualified staff together with business plans if they are to be adequately used nationally and regionally for further training and support of activities in product development, commercialisation and marketing.
- A more detailed mapping of the value chains in each country and the region as a whole should be done using protocols developed by FAO and USAID (FAO, 2006: USAID, 2008, 2009) so as to reflect the dynamic nature of the chains.
- There is a need to evaluate (post-project) the actual impact of the projects' interventions at the various links of the value chains (that is, gap analyses); this will allow for adequate decision-making and policy formulation for future development of the RT and PA Industries in the Region.

9. Conclusions

CARDI and the CFC/EU have invested in infrastructure and training in valued-added operations, quality planting material propagation infrastructure and operations, ICT systems, group and cluster formation/strengthening processes, marketing profiles and contractual arrangements, appropriate practices for producers/processors/marketers, as well as training of stakeholders at all links in the RT and PA value chains. These interventions which have been targeted at specific beneficiaries in Jamaica, Haiti, Dominica, Barbados, St Vincent and the Grenadines and, Trinidad and Tobago, have been relevant and have yielded useful outputs. However, a number of policy, technical, and socio-economic issues remain to be addressed to attain sustainability and continuity of the projects' activities. It is expected that policy-makers will review the results of the interventions and assess the needs for further development of the Industries that are critical to the achievement of food and nutrition security in the region.

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