

Project Title:	Cassava Industry Development – Market Assessment and Technology Validation and Dissemination.
Project symbol:	GCP/SLC/010/CDB
Recipient Country(ies):	Suriname, Dominica and Trinidad and Tobago.
Government(s)/other counterpart(s):	Caribbean Development Bank (CDB)
Expected EOD (Starting Date):	March 2016
Expected NTE (End Date):	February 2019
Contribution to FAO's Strategic Framework: (Indicate as appropriate)	<ul style="list-style-type: none"> • Strategic Objective/Organizational Outcome: SO2 – Make agriculture, forestry and fisheries more productive and sustainable • SO4 – Enable inclusive and efficient agricultural and food systems • Country Outcome(s): The three beneficiary countries have stated that value chain development is one of the priority areas earmarked to support the development of their countries. Additionally, the development of value chains would serve as a catalyst to the creation of jobs, the revitalisation of the agricultural sector and the reduction of their high food import bills • Country Programming Framework(s) Output(s): The Country Programming Framework Output for the three countries identifies Sustainable agriculture and rural development as priority for development • Regional Initiative/Priority Area: LAC Regional Initiative 3 (RI3) "Improving Agricultural and Food Systems in the Caribbean.
Environmental and Social Risk Classification	low risk <input checked="" type="checkbox"/> moderate risk <input type="checkbox"/> high risk <input type="checkbox"/>
Gender Marker	G0 <input type="checkbox"/> G1 <input checked="" type="checkbox"/> G2a <input type="checkbox"/> G2b <input type="checkbox"/>
Total Budget:	1,200,000 USD

Executive Summary

The Caribbean faces a huge import substitution market opportunity for food, flour, feed and beer (and possibly energy) that can be addressed by the development of the cassava industry which already has a production base in almost all of the countries of the region. Recent estimates suggest that countries of the Caribbean Community (CARICOM) currently import, on an annual basis, nearly 900,000 metric tonnes (MT) of wheat for flour and 420,000 MT of corn (mainly for poultry feed). Furthermore, regional beer industry imports nearly 100,000 t of malt annually. All of these industries recognize the substitution possibilities and have expressed interest in utilizing locally-produced cassava in their production systems. To address this demand it is essential to develop the cassava value chain focusing on the supply and yields through improved and increased production, processing and marketing technologies.

Cassava has been prioritized by several countries of the region for development as a food and commodity crop. A multi-purpose crop, cassava is adapted to a wide range of soils and environments. However, the low production and productivity levels in the Caribbean must be addressed if cassava is to become commercially viable. Cassava can also serve to mitigate the negative impacts of the ongoing global crisis which has aggravated food and nutrition insecurity and resulted in higher cost of living, with social dislocation through increased rural unemployment. The heavy dependence on imported foods has resulted in (1) most countries being designated 'net food-importing' nations and (2) a change in food consumption patterns of the populations that have led to high levels of diet-related non-communicable diseases, associated with the highly-processed imported foods. Development of the cassava value-chain will thus also benefit the region from the perspective of rural area development and employment opportunities, preventative health care and reducing the food import bill.

The regional cassava industry, however, remains fragmented and unorganized. In order to exploit the market potential of cassava, it is necessary to promote an integrated approach that results in a sustainable industry with ownership by Caribbean stakeholders. Thus, the current project focuses on the development of the following areas of the cassava industry:

1. On-farm research and dissemination of new cassava production technologies to increase yields
2. Capacity building using farmer participatory extension methodologies to strengthen their capacity to conduct farmer participatory research.
3. Consumer / market development and assessment of the market potential for cassava and its by-products

Institutional strengthening, technology/information development, organizational development and youth and gender considerations will be common themes addressed under all pillars. The project will build on recent and ongoing activities and will be implemented in collaborative partnership with public and private sector agencies and regional organizations, some of which

have recently worked, or are currently working, on developing the regional cassava industry.

The project will be executed by the FAO Sub-regional Office in Barbados (SLC). A Project Implementation Committee will be established to oversee the execution of the project. This Committee will include representatives from Governments as well as Regional and National Organizations and the private sector. It is anticipated that a number of Letters of Agreements (LoAs) will be established with coordinating partners, and consultants engaged for the implementation of specific components. The countries of Suriname, Trinidad and Tobago and Dominica have been identified for assistance in the document and the Ministries of Agriculture in the countries in which the project will be implemented will be responsible for nominating a National Project Coordinator (NPC) at their own cost to support the activities. The project will cover the cost of materials, equipment and expenses for training, official travel and general operating expenses as well as direct operating costs. The total budget for the project is USD 1,200,000.

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ACRONYMS

AOS	Administrative and Operational Services
CABA	Caribbean Agri-business Association
CaFAN	Caribbean Farmers Network
CARDI	Caribbean Agricultural Research and Development Institute
CARICOM	Caribbean Community
CARIRI	Caribbean Industrial Research Institute
CDB	Caribbean Development Bank
CLAYUCA	Latin America and Caribbean Consortium to Support Research and Development of Cassava
COTED	Council of Trade and Economic Development
CSOs	Civil Society Organisations
BMCs	Borrowing Member Countries
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
HCN	Hydrogen Cyanide
IITA	International Institute for Tropical Agriculture
IICA	International Institute for Cooperation on Agriculture
MOA	Ministry of Agriculture
OECS	Organisation of Eastern Caribbean States
RADA	Rural Agricultural Development Authority
SRC	Jamaica Scientific Research Council
t/ha	tonnes per hectare
TTABA	Trinidad and Tobago Agri-business Association
UWI	University of the West Indies

SECTION 1 - RELEVANCE

GENERAL CONTEXT

Rationale

The agricultural sector is a significant contributor to economic growth and social development in many Borrowing Member Countries (BMCs) of the Caribbean Development Bank (CDB), which include all 14 FAO Member countries in the Caribbean Sub-region. The sector's contribution to Gross Domestic Product (GDP), whilst on a general downward trajectory, remains higher than 20% in Guyana and Haiti and over 10% in Belize and Dominica. The sector is also a significant contributor to employment, and food and nutrition security particularly in rural areas in several BMCs.

The Food and Agriculture Organisation of the United Nations (FAO) estimates that Caribbean Community (CARICOM) has an annual food import bill in excess of four billion United States dollars (USD4 bn) with imports nearly doubling over the last ten years. A high percentage of these imports are semi-processed and highly processed staples. Two of the top ten imports by value are corn¹ and wheat flour² which combined account for approximately 10% of the Region's food import bill. High rates of consumption of processed foods have been linked to an increase in the incidence of diet-related, non-communicable diseases (hypertension and diabetes) across the Caribbean.

With several BMCs experiencing low or negative growth due in part to the impact of the 2008 global food crisis and Great Recession, governments and policymakers are increasingly turning to the agricultural sector as a means of improving social resilience, and addressing economic stagnation and inflationary pressures. In order to achieve these objectives, the Region is seeking to adopt a two-pronged strategy - efforts are being made to: (i) enhance the productivity (and product offering) of traditional export crops and staples (including cassava, banana and cocoa) where viable markets exist; and (ii) produce a wider range of fruits and vegetables through the use of modern production systems, including protected agriculture structures. In both instances, efforts are being made to establish linkages between the agricultural and hospitality sectors. Regional agricultural support institutions³, including the CDB, are committed to supporting the Region in pursuit of these policy objectives by facilitating the provision of public goods, and creating an enabling environment to facilitate the operations of private sector interests. In this regard, CDB is supporting BMCs in the following key areas:

- (a) agricultural research and development, stakeholder capacity building and information dissemination;
- (b) measures to build resilience against the projected impact of natural hazard events - including those associated with climate change; and
- (c) support systems for small farmer risk management and transfer mechanisms.

¹ Imports are estimated at approximately 420,000 metric tonnes (mt) valued at approximately USD145 mn

² Imports are estimated at approximately 900,000 mt valued at approximately USD250 mn.

³ Including the FAO, Inter-American Institute for Cooperation on Agriculture (IICA), Caribbean Agricultural Research and Development Institute (CARDI) and The University of the West Indies (UWI).

Several BMCs have identified the development of the cassava industry as a means of spurring agricultural sector output.

Cassava is a perennial woody shrub with an edible root that can be harvested between 6 and 12 months after planting, depending on variety. There are two general classifications of cassava - sweet cassava and bitter cassava. Sweet cassava can be consumed directly after cooking. On the other hand, bitter cassava contains Hydrogen Cyanide (HCN) and must be processed before consumption. HCN and nutrient composition differ according to variety, age at harvesting, soil conditions, climate, and other environmental factors. Both types of cassava have high fiber content, are rich in carbohydrates, calcium, vitamin B and C, and essential minerals. Cassava is also gluten free and has a relatively low glycemic index when compared to processed wheat flour. As a result, cassava can be included as part of a healthy diet, an alternative to wheat flour and is particularly attractive to persons suffering from Celiac Disease and Diabetes.

Cassava can thrive in a wide range of agro-ecological zones. An important attribute of the crop is its high drought tolerance and capacity to give relatively good yields on marginal soils. According to the International Institute for Tropical Agriculture (IITA), worldwide, the major pests of cassava are mites and insects, whilst the main diseases are cassava mosaic disease, cassava bacterial blight, anthracnose and root rot. IITA estimates that pests, diseases and poor cultivation practices combined can cause yield losses as high as 50%. The Caribbean Agricultural Research and Development Institute (CARDI) has noted similar pests and diseases in the Caribbean, but the impact on production/yields has not been quantified.

Researchers have developed improved cassava varieties which are disease and pest tolerant, low in HCN content, drought tolerant, high yielding and early maturing. Meanwhile, work done by IITA and the Latin America and Caribbean Consortium to Support Research and Development of Cassava (CLAYUCA) using improved postharvest strategies, including the use of simple machines and tools, has resulted in a substantial reduction in losses and labour costs (e.g. IITA has been able to reduce losses by 50% and labour by 75% in some African countries).

The Cassava Industry in the Caribbean

Cassava has a production base in almost all countries of the Caribbean and has for decades been produced as a subsistence crop – either as a monoculture or intercropped with vegetables, other root crops, and on plantations (coconut and sugar). Farm sizes have generally been less than 3 hectares, but, given recent increases in demand, some islands, notably Trinidad and Tobago and Jamaica, have been reporting an increase in farm size.

Generally, both production and processing systems in the Caribbean can be characterised as low input operations with attendant low yields and high production cost. Low yields are attributed to poor quality plant materials and agronomic practices and low soil fertility/input delivery systems. Public sector support for the industry's development has been limited, partly due to human, technological and financial constraints. According to the FAO, average yields in the Caribbean are less than 10 tonnes per hectare (t/ha), whilst Brazil records yields

as high as 40 t/ha⁴ and evidence from CARDI's small-scale trials have recorded yields as high as 50⁵ t/ha.

Over the past decade, there have been a number of public and private sector led initiatives to develop cassava products in the Caribbean. Several products developed as a result of these initiatives have wide-reaching appeal/market potential. These include cassava flour (as a stand-alone gluten free product⁶ and in the manufacture of composite breads), cassava chips, frozen cassava, cassareep and farine. A brewery in Jamaica recently announced plans to invest USD10 million over the next five years to establish a cassava value chain as part of ongoing efforts to utilise cassava as an input in the manufacture of beer and to date, approximately USD1.1 mn has been invested in the initiative. Cassava can also be used for the production of animal feed in addition to a range of other products including sweeteners, glues, plywood, textiles, paper, bio-degradable products, monosodium glutamate, and pharmaceuticals.

The Jamaica Scientific Research Council (SRC), the Rural Agricultural Development Authority (RADA) and the Trinidad and Tobago Agri-business Association (TTABA) have been leaders in cassava product development in the Caribbean. The SRC and RADA have developed a cassava pancake mix which is used widely in Jamaica, including in the fast food industry. TTABA has successfully developed and marketed a range of frozen and bakery products⁷ made from cassava. These products are now widely available on supermarket shelves in Trinidad and Tobago. The Government of Suriname has also developed an industrial project for the processing of cassava into flour and gluten-free products. Indications are that these initiatives could be up-scaled, both nationally and across the Caribbean.

Preliminary analysis of the cost of production data based on CARDI and FAO research, as well as global trends, suggests that key to the development of a viable cassava industry in the Caribbean is improvement in productivity, efficiency of processing systems and adherence to modern food safety systems.

The Cassava Market Potential

The increase in demand for cassava is largely on account of its proven superior health and nutritional benefits (high in fibre and gluten free) when compared to processed wheat flour. Research and product testing⁸ has shown that bread containing up to 20% cassava flour (reports from TTABA indicate that the blend could be as high as 35%) tastes the same as 100% wheat flour bread – without compromising texture, appearance and shelf life. Some consumers actually rate bread baked with 10% to 20% composite flour higher than 100% wheat flour in aroma, colour, flavour and texture. From a product development viewpoint

⁴ FAO Publication, 'Cassava – A Guide to Sustainable Production Intensification'

⁵ CARDI presentation, 'Status of Cassava in the Caribbean: Multipurpose Crop of the 21st Century' presented to Regional Conference, 'Development of the Cassava Industry in the Caribbean'

⁶ Cassava flour is a cost-effective alternative for persons suffering from 'gluten intolerance', given the relatively high cost of gluten-free flour

⁷ TTABA has successfully promoted the use of grated cassava (up to 35% by volume) in the manufacture of cassava bread in Trinidad and Tobago

⁸ Eddy N. O, Udofia P. G, and Eyo D (2007). Sensory evaluation of wheat/cassava composite bread and effect of label information on acceptance and preference

these are impressive attributes since increasing consumption of cassava through composite breads is not dependent on changing consumer behavior.

Some developing countries, (most notably Nigeria and Brazil – which have legislated that bread must contain a minimum 10% cassava flour), have developed vibrant cassava industries through the introduction of measures encouraging the use of cassava in the manufacture of composite breads. Meanwhile, preliminary analysis done by the FAO⁹ suggests that cassava has the potential to replace a significant percentage of wheat flour and corn imported by CARICOM Member States with attendant reductions in foreign exchange outflows.

Composite bread/bakery products and cassava chips are widely available in Trinidad and Tobago largely as a result of the efforts of TTABA – which has established a factory for the processing of cassava, promoted the health benefits of cassava and trained bakers in the manufacture of bread using composite flour. Work done by TTABA also suggests that cassava fries could be a viable alternative to Irish potato fries. Indications are that the success of the TTABA initiative can be replicated in other BMCs. However, there is widespread acknowledgement that unless cassava yields are improved with a corresponding reduction in cost of production, the demand for cassava products is not likely to experience substantial growth in the Caribbean.

Overcoming the Constraints to Cassava Industry Development

In an effort to facilitate cassava industry development in the Caribbean, the CARICOM Agriculture Cluster¹⁰ has endorsed plans by national governments to develop their respective cassava industries. FAO has been appointed the lead agency to assist CARICOM member states in this regard.

FAO is an agency of the United Nations that assists developing countries and countries in transition to modernise and improve agriculture, forestry and fisheries practices. FAO has 194 member states, along with the European Union (EU) (a "member organisation"). For the period, 2014-2015, FAO has outlined the following priorities:

- (a) Help eliminate hunger, food insecurity and malnutrition.
- (b) Make agriculture, forestry and fisheries more productive and sustainable.
- (c) Reduce rural poverty.
- (d) Enable inclusive and efficient agricultural and food systems.
- (e) Increase the resilience of livelihoods from disasters.

The FAO serves CDB's BMCs through a Sub-regional Office based in Barbados with satellite offices in Trinidad and Tobago, Jamaica and Haiti. The Sub-regional Office is staffed by 11 professionals with a range of expertise in crop production and protection, livestock production and health, fisheries and aquaculture, economics, forestry, project management, econometrics, and land and water management. FAO also has access to a global pool of

⁹ FAO Sub-regional Office for the Caribbean, Issue Brief # 11.

¹⁰ An inter-agency group that advises the CARICOM Secretariat on measures that should be instituted to address agricultural development challenges in the Caribbean. The Cluster also serves as a mechanism for coordination of initiatives of agricultural support institutions.

experts in all aspects of agro-processing and marketing and is committed to investing in parallel initiatives to ensure a strong focus on supporting ongoing and potential private sector initiatives related to cassava industry development. The FAO adheres to international best practice in the procurement of goods and services, financial management and reporting. The Sub-regional Office has considerable experience in the implementation of programmes (financed directly by FAO and international donors, including the EU) targeting stakeholders in CDB's BMCs.

Supporting CARICOM Member States in the development of their cassava industries is presently a priority for the Sub-regional Office. FAO leads a 'Regional Cassava Working Group' which includes the CARICOM Secretariat, the Organisation of Eastern Caribbean States (OECS) Commission, IICA, CARDI, Caribbean Agri-business Association (CABA), Caribbean Farmers Network (CaFAN), CDB, and the Barbados Cassava Task Force. The Working Group focuses on three key outputs, namely:

- (a) increased on-farm production and raw material supply;
- (b) enhanced processing and commercialisation capacity; and
- (c) expanded consumer/market development capacity.

The FAO Office has committed to assigning up to a tenth of professional staff's time to matters related to the industry's development.

A key output of the Regional Cassava Working Group is the development and implementation of activities to facilitate an improvement in the productivity of cassava in the Caribbean. Planned and ongoing work by institutions working in the Caribbean towards development of the cassava industry include:

(a) CARICOM Secretariat, with financing from the EU, is in the process of engaging consultants to assist in the development of a regional cassava industry policy framework that will, among other things, seek to:

- (i) ensure greater efficiency in the structure and institutional management of the cassava industry through well-defined roles for regulatory, standards and promotional bodies;
- (ii) establish clear public policy, trade and investment incentives for production, processing, utilisation and marketing of cassava and cassava-based products; and
- (iii) assist BMCs in the development of interventions to promote the use of cassava products.

(b) CARDI has developed a protocol for the safe movement of planting material within the Caribbean;

(c) FAO is implementing a project aimed at developing protocols to reduce postharvest losses in cassava and supporting farmer-buyer linkages (including contract farming) in the Caribbean and assisting the Government of Barbados to increase the productivity of cassava;

(d) IICA is implementing a project which will, among other things, seek to strengthen producer organisations and the linkages between farmers and markets; and

(e) TTABA has been actively promoting the use of cassava in the production of bread in Trinidad and Tobago.

Most significantly, as indicated earlier, private sector operatives have started investing in cassava or have expressed a strong interest in participating in the cassava industry.

Alignment and Strategic Fit

This project will be under the umbrella of FAO's Regional Initiative 1 – "Improving Food and Feed Systems in the Caribbean" and grounded in Strategic Objectives: - SO4 – Enable inclusive and efficient agricultural and food systems and SO 2 – Make agriculture, forestry and fisheries more productive and sustainable.

Organizational Outcomes (SO4):

Enhanced public and private sector collaboration in addressing the challenges and risks faced by smaller and disadvantaged participants in food and agriculture.

Organizational Outcomes (SO2):

Producers and natural resource managers adopt practices that increase and improve the provision of goods and services in the agricultural sector production systems in a sustainable way.

FAO's comparative advantage

At the global level, FAO has considerable expertise and broad understanding of issues related to cassava biology and value-addition, as well as experience in working in partnership with key commodity group organizations (CIAT, CIP, CLAYUCA) in the Latin-American region. Indeed, the project will benefit from the pilot programmatic regional initiative being implemented in Ghana under a new FAO project, which has established cassava as a priority crop. During the implementation of projects under various programmes in recent years, FAO has developed strong partnerships with key regional and national agencies: CARDI, IICA, CARICOM Secretariat, OECS Commission, CDB; Caribbean Industrial Research Institute (CARIRI), farmer and agri-business associations (CaFAN, Eastern Caribbean Trading and Agriculture Development Organization (ECTAD), CABA/TTABA), among others.

Stakeholder Consultation and Engagement

Stakeholders

The Programme will target and strengthen a wide cross-section of stakeholders from the public and private sectors. The direct beneficiaries are:

- Farmer organizations: training in management techniques, contract production, marketing and value-added opportunities.
- Rural population: employment opportunities through increased land being brought into cultivation and the establishment of the processing units near production areas.

- Processors: exposure and opportunities to explore and work with new equipment and technologies; women, who are especially active in the processing industry, will have their needs and views taken on board to ensure that more women are employed and that they are fully integrated in the redeveloped industry.
- Local and regional manufacturers and/or importers of simple cassava processing equipment such as graters, presses, dryers etc.
- Commercial producers and suppliers (fast-food outlets, supermarkets) and householders: the development of innovative cooking methods and recipes.
- Animal feed manufacturers: options for substituting local materials in feed stock.
- Country and general population: reduction in food import bill, with enhanced food and nutrition security; additional options for fresh, more nutritious local food.

Stakeholder engagement

The preparation of the proposal involved consultation with a wide range of stakeholders including representatives from the ministries of agriculture and agriculture support institutions across the Caribbean. In addition, in February 2014, CDB, FAO Sub-regional Office for the Caribbean, and University of the West Indies (UWI), in collaboration with the Ministry of Agriculture (MOA), Barbados, facilitated a three-day conference entitled, 'Development of the Cassava Industry in the Caribbean'. The conference was attended by key stakeholders from the public and private sector, civil society and regional agricultural support institutions (including representatives from cassava research institutions in Colombia and Brazil). Presentations/discussions included a review of past and ongoing initiatives designed to develop the cassava industry in the Caribbean, global trends in the production and processing of cassava, the experiences of South American countries in the development of cassava industries, and approaches which could be adopted by the Caribbean in the development of the industry.

Among the conclusions of the conference was that with appropriate policies, increases in productivity, reduction in the cost of production, and improvements in quality standards, cassava could be easily transformed into a commercial commodity for sustainable food security, poverty alleviation and income generation. There was general consensus that the demand for cassava derived products was on the increase in the Caribbean and that cassava was a viable substitute for wheat flour in bakery products and maize in the manufacture of animal feed. Demand for traditional products, by both nationals and tourists, was also on the increase.

To this end, there was general consensus that the proposed intervention was timely, and BMCs in general agreed to provide the personnel and other resources required to ensure the successful implementation of the proposed project.

LESSONS LEARNT

The proposed project is based on lessons learned by the public sector and donors in the development of the agricultural sector interventions in the Caribbean. These include:

- (a) traditional approaches were public sector driven and often made the assumption, wrongly, that by driving production, market opportunities will emerge. The proposed

project recognises ongoing private sector interventions and a growing global and regional interest in cassava derived products. It includes a component to assess the market demand for different types/varieties in the Caribbean;

(b) the need for appropriate technical expertise to support project outcomes. By partnering with FAO, an institution with wide ranging and relevant expertise in the development of agricultural/agro-processing enterprises globally, the approach to the cassava industry's development will be all encompassing; and

(c) to be effective as a regional public good, the research should reflect the varied conditions in the Caribbean. The project has been designed to account for the varied agro-ecological conditions in CDB's BMCs.

Knowledge Sharing and Lessons Learned

EXPECTED RESULTS

It is proposed that CDB provide a grant to the FAO Sub-regional Office in Barbados to support BMCs in the implementation of a project geared towards investigating the feasibility of improving the productivity of cassava in the Caribbean. Working with a wide range of stakeholders and through existing national structures, the proposed project seeks primarily to validate the applicability of improved cassava production technology in the Caribbean. In parallel, the project will also provide opportunities, through the use of participatory methodologies, to strengthen human and institutional capacity in the target countries which will increase the productivity of cassava in a sustainable manner.

The proposed project will assist selected BMCs to:

- (a). conduct applied research in cassava production using improved varieties - high yielding, early maturing, disease and pest resistant - sourced from agricultural support institutions in Colombia (CLAYUCA) and/or Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA) Brazilian Corporation for Agricultural Research. These research stations have long-standing experience in the development of cassava varieties suitable for tropical conditions. In addition, CLAYUCA is an affiliate of the International Center for Tropical Agriculture (CIAT) which has global responsibility for the improvement of cassava; whilst Brazil, which has a shared border with two of CDB's BMCs, is a world leader in cassava production;
- (b). demonstrate improved crop management practices that increase cassava yields in a sustainable manner;
- (c). disseminate new cassava production technologies using farmer participatory extension methodologies;
- (d). strengthen their capacity to conduct farmer participatory research; and
- (e). assess the market potential for cassava and its by-products.

CDB recognises that, given cost considerations, it is not possible to simultaneously conduct project activities in all BMCs that have expressed an interest in exploring the feasibility of developing their cassava industries. As a result, in the interest of efficiency, it is proposed to limit interventions to one country each, representing – one mainland, one large island and

one small island state - on the basis that they collectively represent the varied agro-ecological conditions (with the exception of water scarce countries) and production systems which characterise CDB's BMCs. In addition, the following factors were also taken into consideration:

(a) Suriname (mainland) - has established a factory for the production of cassava flour and has, in collaboration with a local flour mill, test produced composite flour and bread. Whilst management of the flour mill has expressed¹¹ a keen interest in producing and marketing the composite flour they have indicated that the high raw material cost makes the venture unattractive.

(b) Trinidad (large island) - the Caribbean Agri-business Association/TTABA (in collaboration with UWI, Caribbean Industrial Research Institute (CARIRI), American Institute of Bakery, Kansas State University, and Texas A and M University) has developed a range of frozen and bakery products from cassava which are widely available and utilised by an estimated forty bakeries and the general public in Trinidad and Tobago. TTABA however indicates that the high production cost of cassava is a key factor limiting market expansion; and

(c) Dominica (small island - water abundant) - has a long tradition, particularly among the indigenous population, of using cassava products. In recent years, cassava products have found widespread appeal. In general, processors have constantly lamented the fact that cassava is frequently in short supply – an impediment to efforts to supply a growing demand.

FAO and CARDI are currently providing support in developing the cassava industry in Barbados, one of the most water scarce countries in the Caribbean.

Impact

The major impact of the project will be its contribution to agricultural diversification and revitalisation and the enhanced viability of the agricultural sector in the Caribbean Development Bank's Borrowing Member Countries.

Outcome

The outcome is enhancing the capacity for evidence-based decision making regarding the development of the cassava industry in selected CDB's BMCs.

Project Description

The proposed project forms part of ongoing efforts by CDB to increase agricultural sector output, improve rural livelihoods, food and nutrition security and reduce poverty in its BMCs. The project will focus on adaptive research – the testing of improved cassava varieties and production systems, and the conduct of a market assessment towards the goal of providing guidance to BMCs on the likely viability of commercial cassava production. Key activities under the project are:

- (a) testing of improved cassava varieties:
 - i. sourcing of improved varieties adapted to agro-ecological conditions and farming systems in selected BMCs;

¹¹ Meeting in Suriname between CDB Staff and the management of the Surinamese flour mill

- ii. evaluation of improved varieties using a combination of research station and on-farm methods in keeping with established methodologies and best practice (including the establishment of large-scale demonstration plots on farmers' fields in different zones in project countries). utilize farmer participatory methods for the demonstration plots to supplement the information collected on research stations and to identify truly superior varieties by agro-ecological zone / farming system in each country; and
- iii. train Extension Officers in the application of improved cassava production technologies (preparation and selection of plant material, land preparation, soil fertility and management, integrated pest and disease management and other proven best practices) and the transfer of this knowledge and information to farmers.

(b) conduct of market assessment to:

- a. determine the price elasticity of demand for cassava derived products (composite bread, high quality cassava flour and cassava chips)
- b. identify appropriate distribution channels and product requirements for marketing; and
- c. make recommendations for increasing consumer demand.

SECTION 2 – FEASIBILITY

RISK MANAGEMENT

Significant risks facing the project

The overall risk to the proposed project is set out in Table below.

SUMMARY OF MAJOR RISKS AND MITIGATION MEASURES

Risk Type	Description	Mitigation
Operational	Farmers are unwilling to use their farms as demonstration plots leading to an inability to prove that technologies are viable on farmers' holdings and consequently low uptake of technology.	Initially plots will be established on research stations and through field days, farmers will be exposed to the technology.
Implementation	Introduced varieties are susceptible to cassava pest and diseases that are present in the Caribbean. Improved planting material is infested with new pest and diseases. Both factors could have a devastating impact on the industry.	Planting material will be sourced from reputable research institutions as tissue cultured plantlets certified as being free of pest and diseases. Only varieties that are tolerant to known cassava pest and diseases will be introduced.

IMPLEMENTATION AND MANAGEMENT ARRANGEMENTS

The project, to be implemented over a period of 36 months, will be executed by FAO. It will be implemented by a multi-disciplinary team consisting of contracted service providers and selected FAO technical staff in keeping with the Terms of Reference (TOR) detailed in Appendices. Overall guidance will be provided by the FAO headed, 'Regional Cassava Working Group'. CDB staff is satisfied that the FAO Sub-regional Office has the requisite expertise and administrative systems to effectively execute the proposed project.

FAO will assign its Crop Production and Protection Officer to serve as the Project Coordinator (PC) in keeping with the Scope of Services in the Appendices. In addition, FAO will:

- (a) procure the services of Consultants with the requisite expertise and experience in the conduct of cassava production and processing technology validation and associated dissemination and market assessment;
- (b) work closely with other agricultural support institutions (regionally and internationally) to ensure that the technologies promoted under the proposed project are up-to-date and reflect best practice in the industry; and
- (c) assign other professional staff on an as needed basis.

Day-to-day follow-up of country validation/demonstration trials will be facilitated through the respective MOAs. In this regard, FAO will enter into a Memorandum of Understanding (MOU) with each participating MOA specifying the nature of the support contemplated under the proposed project. Within the framework of this MOU, each MOA will assign an Extension Officer to work with the consultants and FAO on the execution of the project. The Extension Officer will, among other things, be responsible for assisting with the identification of suitable locations for the establishment of trial plots, arrangements for establishment and maintenance of plots, and assisting with the organisation of stakeholder training. FAO has an outstanding record of working with CDB's BMCs in executing agricultural sector interventions. FAO also has the capacity to support enterprise development and will work with private sector bodies and farmers' associations to ensure that there is strong private sector participation in the development of the industry.

Government Inputs

The Ministries of Agriculture of recipient countries and FAO will be the collaborating entities responsible for the execution of the project. The participating countries will ensure the provision of all necessary staff, office and transport for the project activities. A National Project Counterpart (NPC), fully dedicated to the implementation of this project will be appointed by the Ministry of Agriculture of each country with overall responsibility for national inputs, facilitation of project activities and communication with national consultants, international FAO consultants, other participating and of events relating to project implementation. The contribution from the Ministries of Agriculture will be their commitment to facilitate project activities and to ensure the availability of Ministry staff to participate in project activities. The Governments of the recipient countries will be responsible for:

- (a) making available collaborating technical personnel as may be necessary for the successful implementation and completion of the project;
- (b) ensuring facilitation for staff to participate in the various training and workshop activities as well as in the cassava steering committee to be established.

Upon project conclusion CARICOM will support its member countries in the process of incorporating the project recommendations within their work programmes.

MONITORING, PERFORMANCE ASSESSMENT AND REPORTING

Scope and Purpose

The PC will report to FAO's Sub-regional Coordinator and will be responsible for the preparation and submission of reports, as well as for monitoring and evaluation and will provide CDB with the following reports and/or deliverables:

- (a) an Inception Report consisting of a Work Plan with clearly defined tasks, methodologies, budget, timelines and the proposed format for Quarterly Progress and Final reports. The Inception Report should be submitted within two months of signing the Grant Agreement;
- (b) Quarterly Progress Reports; and
- (c) a Final Report including the findings of the research and technical packages developed under the Project.

The format for the presentation of reports will be agreed to between CDB and FAO.

COMMUNICATION

CDB and FAO will ensure that the results of the proposed project will be communicated to other BMCs. This will be achieved through:

- (a) sharing annual reports and the Final Report on the proposed project with MOAs in all BMCs;
- (b) hosting of a workshop (annually) during the Caribbean Week of Agriculture on cassava industry developments; and
- (c) presentations on the proposed project and cassava industry developments in general at the annual meeting of COTED (Agriculture).

SECTION 3 - SUSTAINABILITY OF RESULTS

Outcome: The cassava industry in the Caribbean will be developed from being a low productivity, minimal	Follow-up action to ensure sustainability of each Output	Institution responsible for this follow-up action and the resources it	Contribution of each Output to the sustainability of project Outcome	Contribution of each Output to the impact and the catalytic effects expected to be generated
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commercial processing and utilization to being a modern competitive industry producing value-added products for entrepreneurs and consumers		will provide (human, physical and financial)		
Output 1: Sustainable intensification of production, using the ecosystem approach, demonstrated and promoted	CARDI is the agency mandated by the Governments of CARICOM to facilitate regional R&D functions; CABA and TTABA CaFAN/ECTAD in their respective capacities will continue to link farmers and processors	Ministries of Agriculture, CARDI, CABA / TTABA, CaFAN, ECTAD	High: field production and harvest / post-harvest issues and linkages between farmers and processors are critical to maintain continuous supply of cassava if commercialization / industrialization is to succeed	Important for up-scaling of the cassava value chain. Through processing and value addition by private sector companies, markets for farmers' produce will grow and imports will be substituted by local products
Output 2: Promotion of processing and commercialization	Private sector, industry and other stakeholders use and expand the processing opportunities and the production of the products developed and take on board recommendations resulting in increased industry opportunities for the country and region	Private sector, food- and feed-based industries with necessary policy-level support from the relevant Ministries, CABA / TTABA, CaFAN, ECTAD, CARPHA, UWI	High: Important, particularly for the development and promotion existing as well as new / innovative product development. Private sector has to take over the lead for industrialization /commercialization after the project outputs have been achieved	Critical for the identification and industrialization of specific products, particularly those that are new / non-traditional Uptake by private sector is essential
Output 3. Marketing and	Households not only continue to	Ministries of	Medium-High	Uptake by households and

promotion	use cassava but also use the skills to experiment with other local produce.	Agriculture, Health, CARPHA, IICA, PAHO, UWI		private sector is essential
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Under the project, the launch of a Regional Cassava Industry Association led by the private sector will be promoted. It is anticipated that this entity will undertake the lead responsibility for the further development of the industry

GENDER EQUALITY

In general, gender roles in the cassava industry reflect those which are prevalent in the wider agriculture/small-scale manufacturing sector in the Caribbean. Overall, both men and women make significant labour contributions to cassava production, processing and marketing, with each specialising in different tasks. Men work predominantly on land clearing and preparation, planting, harvesting, and processing (mainly grating of harvested tubers), while women are more actively engaged in crop maintenance, processing and sale of both raw and cottage industry type cassava derived products. Meanwhile, ownership of processing equipment – mills and bakeries - is dominated by men. There is evidence, however, that modernisation of production systems (e.g. the introduction of labour-saving technologies) will result in more active participation by women in both production and processing (e.g. use of mechanical graters). An increase in commercial cassava production in the Caribbean will require investment in modern production systems and accordingly could contribute to an increase in employment/income opportunities for women. Maximising the participation of women in the industry, in particular in commercial processing, will require the development of targeted programmes/incentives (e.g. increasing their access to credit for acquisition of machinery and the provision of training in the operation and maintenance of machinery).

INDIGENOUS PEOPLES¹²

Dominica:

Cassava has always been an important part of the diet of the indigenous Kalinago people of Dominica, and is among their most appreciated food. The bulk of cassava production in Dominica is along the East Coast, where around 3000 Kalinago live in eight villages or hamlets, collectively called the Kalinago Territory. When the cassava has reached maturity stage it is harvested, clean and ground. This is mixed with water and squeezed to separate the starch from the fiber. The fiber alone is baked into Farine or the fiber with a mixture of starch is baked into cassava bread. When making cassava bread, the mixture of cassava fiber and starch is converted into dough, placed onto a pan and baked until cooked. The cassava fibre is similarly placed in the pan and stirred until it is converted to farine.

¹² Indigenous peoples is the internationally agreed term (United Nations Declaration on the Rights of Indigenous Peoples) and it encompasses tribal peoples, natives, First Nations, pueblos originarios, pueblos autóctonos, nomadic and pastoralists, aboriginal and traditional peoples.

The communities of the Kalinago Territory remained isolated into the late 20th century, and as a result, the people have remained possibly the poorest segment of the population of Dominica. The population is very young, with 70% being under 30 years of age. The Territory is a priority for tourists and has numerous shops producing high-quality handicrafts. Agriculture is the main source of income, with cassava and other root crops, banana, coconuts, copra, ginger, tropical fruit and vegetables being grown. Some Kalinago still make their living from the sea.

Suriname:

In Suriname, cassava is widely used by the Creole, Indian, Javanese and indigenous populations in various forms – steamed, deep-fried, soups, local dishes and cassava beer. Grated bitter cassava is used to bake bread. There are five indigenous Amerindian tribes in Suriname – the coastal Arawaks, Caribs and Trios, Wajanas and Akurios that live in the interior. The Maroons are descendants of slaves that escaped from European captors and either joined indigenous peoples or lived on their own. These two indigenous groups constitute 4 and 11%, respectively, of Suriname’s population of 500,000 and mainly inhabit the hinterlands. They practice shifting ‘slash and burn’ agriculture for subsistence and to sell surplus in the market. They plant cassava as a staple, along with other root crops. These indigenous groups use different varieties of cassava that they have developed over time by selection. They also have traditional knowledge of growing and processing cassava, which constitutes an important source of their income from agriculture. Many women are active in this sector. Among the needs identified from various studies is access to land titles and a lack of modern technology for field production.

ANNEXES

ANNEX I – LOGICAL FRAMEWORK.

Results Chain	Indicators				Assumptions
	Indicators	Baseline	Target	Means of Verification (MOV)	
<p>Impact Contribute to diversification and enhanced viability of the agricultural sector in CDB's BMCs</p>			<p>By December 2019 (a) Production of cassava increased by 100% in project target* countries. (b) At least 25% of bakeries in targeted BMCs use cassava in the manufacture of bread on a regular basis.</p>	<p>Impact evaluation of the Cassava Project in the three countries</p>	<p>Continued national and regional political commitment to the promotion and development of the cassava value chain. CARICOM policy guidelines/recommendation on the development of the Cassava industry developed and adopted. Private sector entities support the increased use of cassava and its by-products.</p>
<p>Outcome</p>			<p>By December 2018</p>	<p>FAO and country reports.</p>	<p>Research findings</p>

<p>Enhancing the capacity for evidence-based decision making re development of the cassava industry in selected BMCs.</p>			<p>Stakeholders have access to research results and understand the implications for the industry.</p>	<p>End of project surveys.</p>	<p>demonstrate viability of cassava production and appropriate channels for distribution are identified.</p>
<p>Outputs</p> <ol style="list-style-type: none"> 1. Research plots and associated monitoring system established. 2. Training-of-trainers workshops conducted. 3. Cassava production tech-packs produced and disseminated to industry stakeholders. 4. Framework for the establishment and maintenance of cassava seed banks developed. 5. Market Assessment 			<p>By December 2017:</p> <ol style="list-style-type: none"> (a) Cassava validation trials conducted in each target country on a mix of male and female-owned farms. (b) At least 30 Extension Officers are trained in improved cassava production systems. (c) Approximately 240 farmers (disaggregated by sex) trained in cassava production systems. (d) Manuals on cassava production (electronic and hard 	<ol style="list-style-type: none"> (a) Reports, records and reviews of the project monitoring and evaluation. (b) Training evaluation reports. 	<ol style="list-style-type: none"> (a) Extension Officers, farmers and industry stakeholder provide support to research – field testing of improved production and processing systems. (b) Timely contribution by partners. (c) No extreme weather conditions during the implementation period. (d) Stakeholders (including farmers and MOA technical

		<p>print) developed and disseminated to farmers.</p> <p>(e) At least eight technical factsheets/best practices are elaborated and disseminated.</p> <p>(f) Cassava seed bank framework developed.</p> <p>(g) Market assessment completed.</p>		<p>staff) are participative.</p> <p>(e) Extension Officers and other counterpart staff are available to participate in the project.</p>
Activities				

ANNEX 11 - PROJECT DOCUMENT.

Accts	Input Description	Sub/Child Account	Main/Parent Account
5013	Consultants		104,500
5543	Consultants – National	80,000	
5544	Consultants - TCDC/TCCT	24,500	
5545	Consultants - Retired Experts		-
5547	Consultants - UN Volunteers		-
5014	Contracts		756,300
5650	Contracts Budget	756,300	
5020	Overtime		180,000
5652	Casual Labour – Temporary Assistance	180,000	
5021	Travel		9,200
5661	Duty travel others (only FAO staff)		
5685	Consultants – National		
5686	Consultants - TCDC/TCCT	9,200	
5687	Consultants - Retired Experts		
5694	Travel – Training		
5692	Travel - Technical Support Services		
5698	Travel - Non staff (e.g. counterparts)		
5023	Training		
5920	Training Budget		
5024	Expendable Equipment		90,000
6000	Expendable Equipment Budget	90,000	
5025	Non Expendable Equipment		50,000
6100	Non Expendable Equipment Budget	50,000	
5027	Technical Support Services		
6111	Report costs		
6120	Technical Support Services (Honorarium)		
5028	General Operating Expenses		10,000
6300	General Operating Expenses Budget	10,000	
5029	Support Cost		0
6130	Support Cost Budget	0	
	Grand Total		1,200,000

ANNEX III: TERMS OF REFERENCE

Duty Station: Barbados

Under the overall supervision of the FAO Sub regional Coordinator for the Caribbean and direct supervision of Plant Protection and Production Officer and in close coordination and guidance of the International Administrative Officer, the incumbent will provide *administrative and operational support* to the implementation, monitoring and evaluation of Cassava Industry Development – Market Assessment and Technology Validation and Dissemination project performing the following duties:

- (i) Finalize project documents ensuring that agreed inputs and related specifications are properly reflected;
- (ii) Assist in drafting and formulating initial project budgets, revisions and amendments,
- (iii) Assist in the monitoring and review of implementation of projects to ensure conformity with the Work Plan;
- (iv) Assist in monitoring cash flow of the project, prepare and assemble into final form the project budget revisions, forecasting and financial statements/reports,
- (v) Coordinate field program operation support activities ensuring that the updated information is up loaded into the corporate systems.
- (vi) Oversee the initiation and follow up on administrative actions necessary for the implementation of projects; Letters of Agreement, government clearances, requests for personnel actions, procurement requests and control of projects expenditures
- (vii) Monitor and review commitments/expenditures incurred under the projects and ensure conformity with the financial regulations and administrative procedures of the organization and prepare appropriate revisions and amendments,
- (viii) Monitor and follow up in the framework of the Organization's computerized financial system, a number of financial documents for recruitments, purchases, expenditures authorizations and travel expenses;
- (ix) Ensure that deadlines are met, proper coverage under the project and the work is performed correctly;
- (x) Perform other related duties as required

Qualifications – Essential

Applications are normally not considered from candidates who do not possess all of the essential qualifications

Education: A Bachelor's Degree in Economics or Business Administration

Experience: Five years of progressively responsible experience in planning, project implementation and management/administration of development programmes including the preparation, monitoring and evaluation of development projects and operations procedures

Language: Excellent command of English.

Other:

- Demonstrated ability to work with minimum instructions, initiative, organizational sense and ability to meet deadlines.
- Ability to work under pressure, in a team environment, and maintain effective working relationships with different national and cultural backgrounds.
- Excellent knowledge of Microsoft Office.
- Ability to work with the Organization's computerized financial/personnel systems, word-processing equipment and data processing software.
- Ability to format, perform editorial checks and process documents.