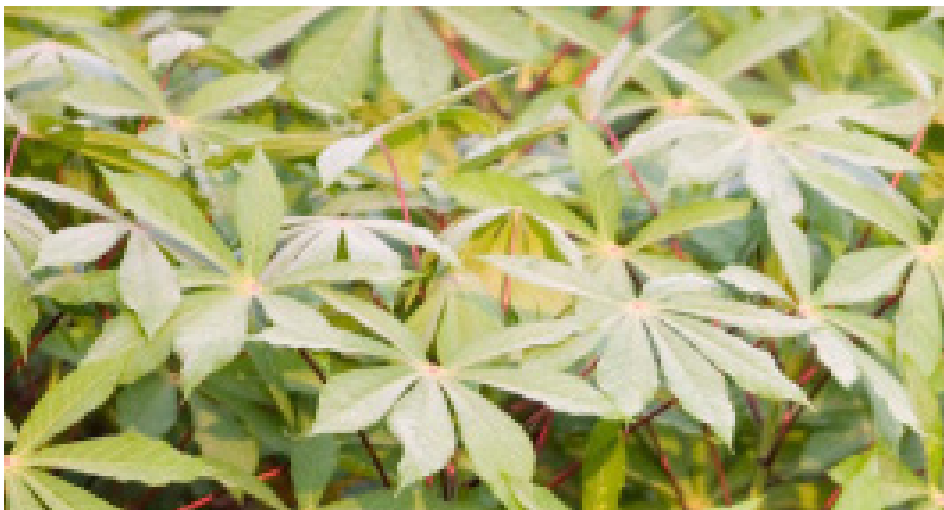




SUBREGIONAL OFFICE FOR THE CARIBBEAN  
ISSUE BRIEF #11

Contributing to the development of a cassava industry OCTOBER 2014



The food and agriculture sectors in the Caribbean Community (CARICOM) are currently facing a number of serious challenges related to low growth and heavy dependence on imported inputs and foods. Historically, the agriculture sector has been the main contributor to economic development in the Caribbean. However the two main economic pillars of the sector – sugar and bananas – have declined significantly over the last decade with earnings from exports of these two commodities drastically reduced due to the loss of market access, mainly in Europe.

At the same time, with a large, growing market of 16 million people in 15 Member States, CARICOM has an annual food import bill in excess of US\$ 4 billion, with imports nearly doubling over the last 10 years. A high percentage of these imports consists of semi-processed and highly-processed staples. Two of the top ten imports by value are corn (mainly for poultry feed) and wheaten flour (mainly for the production of bread). An additional strain on already scarce economic resources caused by the increasing consumption of processed imported foods is the high incidence of diet-related, non-communicable diseases (NCDs) in a wide cross-section of the regional population. These particular changes have severely impacted many of the economies and rural livelihoods in particular.

Nevertheless, more recently, the highest level forums of heads and ministers of governments have identified the food and agriculture sectors among the main pillars of economic and social transformation of the countries of the Caribbean and as a means of contributing to the major national challenges of low economic growth, high debt to GDP ratios and high unemployment. In this context, there is the need to identify new drivers for enhancing agricultural and economic growth, reducing the food import bill, generating employment and revitalizing the rural sector, and arresting the incidence of NCDs.

### KEY FACTS

- ▶ CARICOM has an annual food import bill in excess of US\$ 4 billion. Two of the top ten imports by value are corn (mainly for poultry feed) and wheaten flour (mainly for the production of bread).
- ▶ Cassava has the potential to:
  - replace 400 000 metric tonnes of wheaten flour in CARICOM countries
  - substitute up to 40% of the corn in poultry rations without adverse effects as well as a portion of other animal feeds
  - be more widely consumed as a healthy, staple food
  - on its own address approximately 5% of the Food Import Bill
- ▶ FAO leads a Regional Cassava WorkingGroup which includes the CARICOM Secretariat, the OECS Secretariat, IICA, CARDI, CABA, CAFAN, CDB and the Barbados Cassava Task Force. WorkingGroup focuses on three key outputs:
  - Increased on-farm production and raw material supply
  - Enhanced processing and commercialization capacity
  - Expanded consumer / market development capacity

Confronted with these challenges, Caribbean governments have sought to identify alternative local commodities which can contribute to reducing the high food import bill and increasing the consumption of healthy alternatives in the diet. They have further specified that these alternative commodities should be well-suited to the Caribbean conditions, should not pose too many difficulties for Caribbean farmers to produce, and provide a reasonable income for rural farmers in addition to meeting their nutritional needs.

## Why cassava?

Cassava has been identified by Caribbean governments as one of the priority crops with great potential to contribute to addressing agricultural revitalization and the food import bill. In fact, there is a growing consensus that cassava could become one of the main pillars of the food and agriculture sector and of the economic and social transformation of the region. A prioritized development of a regional cassava industry is expected to address three fundamental problems faced by countries across the Caribbean region:

- ▶ **Low agricultural sector production and productivity along selected value chains;**

- ▶ **Limited utilization of domestic agricultural products; and**
- ▶ **Low level of targeted inclusion of small scale family farmers in the food and agriculture and rural development processes of Member States.**

## Agronomic Factors

According to the International Fund for Agricultural Development (IFAD) and FAO (2004), cassava's success in its evolutionary homeland of Latin America and the Caribbean holds a rich legacy for modern agricultural and food systems. This is a result of:

- ▶ **Broad genetic diversity - several thousand landraces and 100 related wild species;**
- ▶ **Availability of biological control agents with the potential to limit losses from pests and disease-causing pathogens;**
- ▶ **Finely-tuned crop management practices that optimize economic output from a range of environmental and cultural variations; and**
- ▶ **Diversity of processing methods and utilization systems to**

achieve specific management, income, or nutrition goals.

The CARICOM region is well-placed to move the cassava industry forward. Cassava already has a production base in almost all of the countries of the region. It is adapted to a wide range of environments and soil types, making it an ideal crop for expansion on marginal and sub-marginal lands. In general, although it faces serious challenges as a vegetatively propagated crop, cassava responds well to agronomic interventions and has the added advantage of flexible harvesting.

Furthermore, cassava can be processed into different grades of flour, which can form the basis of numerous products. Cassava flour is gluten-free and suitable for persons with celiac disease and gluten intolerance.

## Import Replacement

Traditionally, cassava is utilized for food (fresh root or processed) and animal feed at the household and farm level, respectively. However, more recently the substitution of cassava flour for imported wheat flour has been successfully and commercially demonstrated in the bakery industry. In Trinidad and Tobago sliced bread, normally all wheaten, now has a competitor on the shelf in the form of a cassava-based slice bread.

Non-traditional uses that need to be more widely exploited currently include animal feed (cassava hay, chips, pellets and feed-grade single-cell protein) and industrial applications (biofuel feedstock; sweeteners, alcohol, plywood, textiles, paper). There is clearly considerable scope for developing a variety of products from this single commodity.

The importation of wheat and corn as a contributor to the high import bill is being particularly targeted. Some 900 000 MT of wheat for flour (valued at US \$248.77 million) and 420 000 MT of corn (valued at US \$145.46 million), mainly for poultry feed, is imported by CARICOM countries annually (Figures 1 and 2). Additionally, the regional beer industry imports nearly 100 000 tonnes of malt annually and uses high fructose corn syrup as another ingredient in beer. Analyses conducted in several

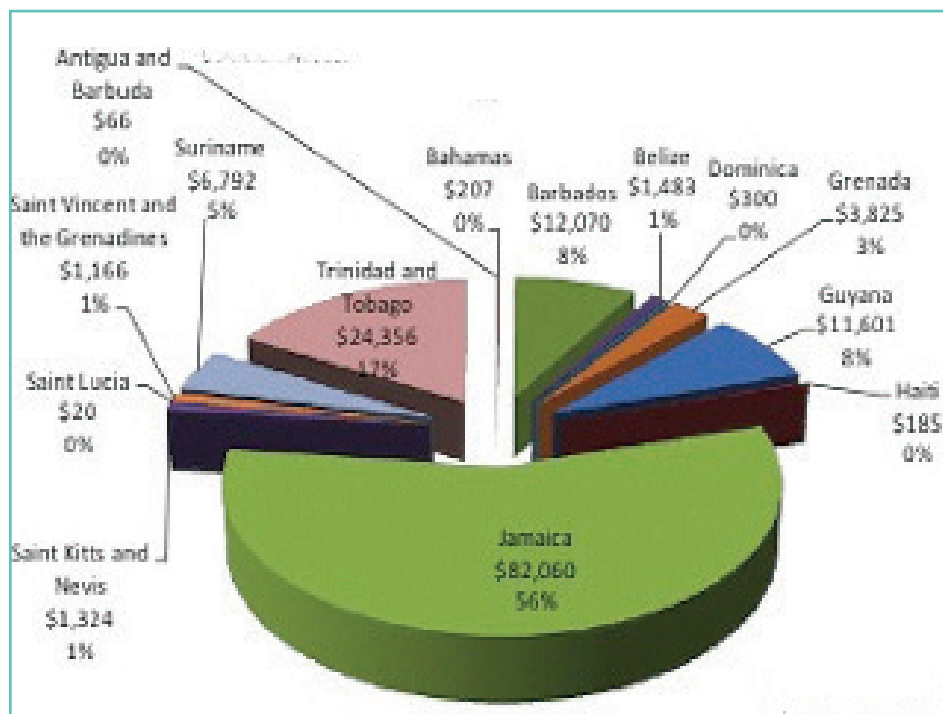


Figure 1 - CARICOM maize imports

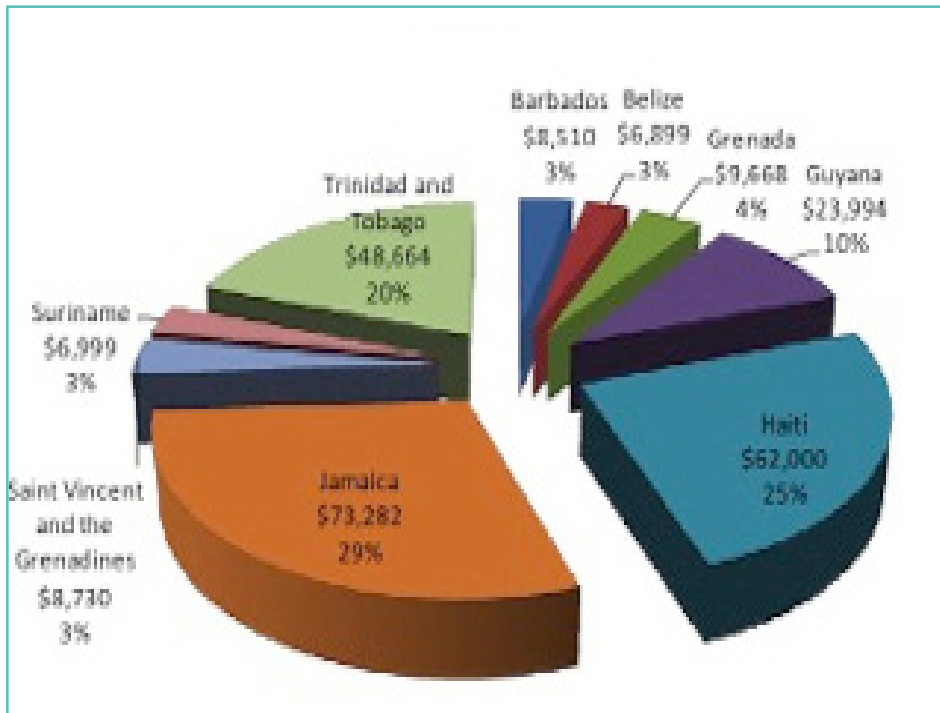


Figure 2 - CARICOM wheat imports

countries indicate that there is a huge, untapped import substitution market opportunity for food, flour, feed and beer (and possibly energy - if volumes of production permit) that can be addressed by the utilization of cassava.

Cassava has the potential to:

- ▶ replace 400 000 metric tonnes of wheaten flour in CARICOM countries;
- ▶ substitute up to 40% of the corn in poultry rations without adverse effects, as well as a portion of other animal feeds;
- ▶ be more widely consumed as a healthy, staple food; and
- ▶ on its own address approximately 5% of the Food Import Bill

## Challenges

The development of the cassava industry in the Caribbean faces several obstacles including:

- ▶ Lack of a favourable policy environment to stimulate farmers and other stakeholders to promote production, utilization and marketing of cassava as both a food crop and a commercial

crop. This has hampered its production and utilization in the food, animal feed, pharmaceutical and paper industries.

- ▶ Lack of access to healthy and improved planting material;
- ▶ Low production levels that do not sustainably meet the demand for both food and industrial use;
- ▶ Lack of research-extension packages to address other technological challenges, often leading to a shift to other crops such as sweet potatoes;
- ▶ Inadequate technology transfer to spur production both horizontally and vertically, and value-addition to broaden and activate market channels;
- ▶ Cassava safety as a result of cyanide content under certain conditions;
- ▶ Image problem due to perception that cassava is a 'poor man's food';
- ▶ Rapid post harvest deterioration under normal conditions and lack of knowledge on the reduction of post-harvest losses;

- ▶ Inadequate awareness of appropriate processing know-how and absence of entrepreneurship;
- ▶ Marketing constraints such as lack of marketing information and intelligence;
- ▶ Lack of knowledge of and compliance to grades and standards;
- ▶ Low returns on investment to farmers due to long marketing chain;
- ▶ Poor farmers organization; and
- ▶ Lack of credit

These challenges have impacted the Caribbean cassava industry in negative ways, the most important being low, inconsistent productivity with low acreages; limited protection from post-harvest losses; limited processing, product and market development strategies.

The lack of appropriate public policies was identified at a Regional Conference on Cassava in the Caribbean and Latin America, held in Barbados from 10-12 February, 2014, as one of the major constraints hindering the production, utilization and commercialization of cassava and cassava-based products in region. It was the conclusion of the Conference that with appropriate policies and quality standards, cassava could be easily transformed from "a poor man's food" into a commercial commodity for sustainable food security, poverty alleviation and income generation through production, utilization, marketing and trade of cassava and cassava-based products. An enabling policy incentive framework should contain provisions that will:

- ▶ Ensure greater efficiency in the structure and institutional management of the cassava industry through well defined roles of regulatory and promotional bodies and enhancing collaboration between key players in the industry;

- ▶ Establish clear policy incentives for production, processing, utilization and marketing of cassava and cassava-based products; and
- ▶ Ensure food security, improve farmers/processors income, create employment and attract private sector participation in the industry.

Traditionally, average yields in the Caribbean are about 4-6 T/ha, although significantly higher yields have been reported in some countries. Low and inconsistent productivity is due mainly to diseased planting material, weak genetic material, and inadequate agronomic and crop management practices. This, coupled with small acreages and high

levels of manual labour, results in very high production costs per unit. In the case of Barbados, it is estimated that a yield of at least 26 t/ha is necessary as a break-even point based on purchase prices for cassava industrialization. (Table 1)

In fact, high unit production cost is recognized as the key deterrent to cassava becoming a major industrial input. Thus, it is recognized that the existing market opportunities in the bakery, feed, and brewery industries can only be realized if unit cost of production is significantly reduced.

Once harvested, cassava is very perishable and deteriorates rapidly if not stored under controlled conditions or processed within 2-3 days. Although

numerous entities are involved in cassava processing, more than 90% are engaged in micro- and small-scale operations utilizing low-level technology, with low outputs. The few exceptions are firms engaged in the processing of frozen cassava pieces. Therefore, there is currently very limited capacity for post-harvest handling and processing.

There is also the need to develop the organizational and entrepreneurial capacity of the producers, moving them to become commercial level producers in order to meet the increased demand for the raw product. The need for the services of adequate, qualified personnel to support the required production drive should also be addressed. This would include technicians who can facilitate the development and application of protocols to enable the smooth flow between supply and demand.

Table 1 - Break even point for commercial cassava production in Barbados

ITEM DESCRIPTION	UNIT COST (BDS \$)	COST/ HECTARE	CUMULATIVE COST PER HECTARE
Land preparation		1,210.00	
<i>Ploughing</i>	350 per ha	350.00	
<i>Harrowing (2 ways)</i>	520 per ha	520.00	
<i>Furrowing</i>	340 per ha	340.00	1,210.00
Planting Material/Planting		970.00	
<i>Planting material</i>	350 per ha	350.00	
<i>Chemical Treatment</i>	80 per ha	80.00	
<i>Planting</i>	540 per ha	540.00	2,180.00
Fertilizing		1,080.00	
<i>Fertilizer (12-12-17) x 2</i>	9 bags per ha @ 55/bag	990.00	
<i>Fertilizer applications (2)</i>	90 per ha	90.00	3,260.00
Weed Control		570.00	
<i>Weedicide -Gramocil</i>	10 Pints @ 15 per pint	150.00	
<i>Weedicide applications</i>	120 per ha	120.00	
<i>Manual weeding (2)</i>	300 per ha	300.00	3,830.00
Pest/Disease Control		290.00	
<i>Pesticides</i>	200 per ha	200.00	
<i>Pesticide applications</i>	90 per ha	90.00	4,120.00
Irrigation	800 per ha	800.00	4,920.00
Harvesting/Transportation		1,670.00	
<i>Reaping</i>	950 per ha	950.00	
<i>Packing/bagging</i>	220 per ha	220.00	
<i>Transportation</i>	500 per ha	500.00	6,590.00
<b>Total</b>			<b>6,590.00</b>
<b>COST PER MT AT:</b>	<b>15 MT PER HECTARE</b>		<b>BD\$439 (US\$220)</b>
	<b>25 MT PER HECTARE</b>		<b>BD\$264 (US\$132)</b>
	<b>30 MT PER HECTARE</b>		<b>BD\$220 (US\$110)</b>

In terms of developing valued-added products, much can be learnt from the wheat, corn, rice and white potato industries. These products dominate the world food supply, not only because they are produced in large quantities and are relatively inexpensive, but because they are used to produce a wide range of value-added/processed food products. Indeed, it is the wide range of value-added products emanating from the raw material base product that gives rise to their massive demand. The value-added products have been developed because of large and on-going investment in new product research and development.

FAO has conducted financial viability analyses on the industrialization of the cassava industry in Barbados, with specific focus on:

- ▶ the production of cassava chips for animal feed, replacing imported corn (Table 2); and
- ▶ the production of cassava flour for consumption by household and bakeries, replacing wheaten flour (Table 3).

The industrialization investment models are highly sensitive to farm output productivity.

Table 2: CASSAVA – CORN REPLACEMENT MODEL – CASSAVA CHIPS

Farm Output Level (MT/Ha)	Price of Fresh Cassava (US \$/MT)	Net Present Value (US \$)	Internal Rate of Return (%)
25	145	(689,118)	<0
28	130	91,029	17.5
30	121	739,117	49.6
ASSUMPTIONS			
The Plant	Plant Cost – US \$180,000; Plant Size – 300 MT Chips per month; Plant operates 28 days per month for 12 months; Five Workers at different levels – Average cost of US \$1,00 per worker.		
The Cassava	Conversion Factor – Cassava to cassava chips -2.7; Fresh cassava required – 810 MT per month		
Corn	Price of imported corn – US \$400 per MT		

Table 3: CASSAVA – WHEAT FLOUR REPLACEMENT MODEL – CASSAVA FLOUR

Farm Output Level (MT/Ha)	Price of Fresh Cassava (US \$/MT)	Net Present Value (US \$)	Internal Rate of Return (%)
25	145	(651,035)	<0
28	130	80,827	10.4
30	121	2,221,016	7.24
ASSUMPTIONS			
The Plant	Plant Cost – US \$180,000; Plant Size – 44.2 MT Cassava flour per month; Plant operates 28 days per month for 12 months; Five Workers at different levels – Average cost of US \$1,00 per worker.		
The Cassava	Conversion Factor – Cassava to Cassava flour – 3.75; Fresh cassava required – 168 MT per month; Price of Cassava flour – US \$735/MT; Price of Cassava by-products – US \$200/MT		
Wheat flour	Price of Imported of wheat flour – US \$940 per MT		

The region has a very urgent need to establish a Research and Development (R & D) policy for staples. It is also critical to establish a mechanism for the coordination of value-added research, innovation and development and for the acquisition of modern technology to develop products (flour, composite flours, extruded snacks, instant flakes, breakfast cereals, pancake mixes, cereals, pasta, and a wide range of bakery items) from our staples.

On the demand side, potential suppliers of cassava products are faced with the task of attracting consumers who have developed a preference for imported staples. In addition to low prices, the competing imported products are available in a range of convenient, attractive, easy-to-use forms.

To enter this higher valued market, it is necessary to improve and increase processing capacity so that it will firmly establish a model cassava value chain process which is replicable. Establishing this capacity in rural areas will provide employment opportunities, to youth and women particularly, and will help stem current migration levels and revitalize rural communities.

On the intermediate and final consumer market end, promotional activities are needed to increase usage of cassava. This includes targeting the largely-untapped tourism and fast-food markets for several products, such as the ever-popular french fries. Examples from countries like Jamaica, where sports heroes have been used to promote locally-grown root crops, could be

followed. A well-coordinated cassava marketing strategy could make the export of both fresh and processed cassava highly likely. However, in the medium to short term there are ample opportunities in the domestic food consumption and animal feed markets to substitute for imported products.

### The way forward

It is recognized and agreed that the approach to meeting targets for substituting cassava for some percentage of wheat flour (bread) and maize (poultry feed) requires a value chain approach with action by agencies undertaken on the basis of their comparative advantage and available resources. The CARICOM Agriculture Cluster that coordinates food and agricultural development in the region has endorsed a value

chain approach to developing cassava as a major product for increased use in bakery, feed and other industries. FAO was asked to lead the formalized official working group on cassava with membership being the CARICOM Secretariat, the OECS Secretariat, IICA, CARDI, CABA, CAFAN, CDB and the Barbados Cassava Task Force. The Cassava Industry development agenda will focus on raising productivity behind the farm gate, beyond the farm gate and at the market and utilization points all along the value chain. Specific targets are being set to replace a percentage of selected imports than can be competitively supplied within the region. Table 4 represents cassava replacement equivalent (MT) for 10%, 20% and 30% replacement of combined wheat and corn.

Table 4: Cassava Replacement Equivalent (MT) for combined 10% replacement of wheat and corn

COUNTRY	10% Replacement Equivalent (MT)	Cassava Fresh Root Equivalent (MT)	Acreage (hectares) Required at Yields of:		
			20 MT/ha	25 MT/ha	30 MT/ha
Antigua and Barbuda	510	1,913	96	77	64
Bahamas	574	2,153	108	88	72
Barbados	5,677	17,476	874	699	583
Belize	1,395	5,231	262	209	174
Dominica	281	963	48	39	32
Grenada	2,884	9,683	484	387	323
Guyana	6,330	20,196	1,010	808	673
Jamaica	41,270	126,751	6,336	5,070	4,225
St. Kitts and Nevis	788	2,295	115	92	77
St. Lucia	234	876	44	35	29
St. Vincent & Grenadines	1,674	5,955	298	238	198
Suriname	4,149	13,381	669	535	447
Trinidad and Tobago	17,447	57,003	2,850	2,280	1,900
<b>Total</b>	<b>83,212</b>	<b>263,876</b>	<b>13,196</b>	<b>10,555</b>	<b>8,798</b>

Under an FAO-funded Letter of Agreement to the University of the West Indies (UWI) and in collaboration with the Ministry of Agriculture in Barbados, a Conference entitled 'Development of the Regional Cassava Industry in the Caribbean', was successfully held in Barbados from 10-12 February 2014. Key stakeholders from the public, private sector and civil society organizations from cassava-producing countries as well as representatives of support agencies of the region attended the Conference and agreed on a cassava industry development strategy.

Out of these activities, and recognizing cassava's huge potential, the Governments of CARICOM countries have requested assistance from regional and international agencies to support the commercialization of cassava. The countries need assistance in implementing a comprehensive strategy for establishing/upgrading cassava value chains to meet current and potential demand.

A number of initiatives are already underway in several CARICOM countries in support of the production and utilization of cassava, as well as of other root crops. This is the case in Barbados, Jamaica, Suriname and St. Vincent and the Grenadines and Trinidad and Tobago where very recently there have been gains in the processing of cassava products. The programme of the FAO-led working group for the development of the cassava industry will link into activities under current initiatives and take into consideration outputs and lessons learned from relevant,

recently-concluded projects. It will build on the work undertaken by national agencies (Barbados, Jamaica and Guyana) as well as by CARDI on production and post-harvest issues in St. Vincent and the Grenadines and by TTABA in Trinidad and Tobago on commercialization and adding value.

The Regional Cassava Working Group Programme focuses on the development of three key outputs:

- ▶ **Increased on-farm production and raw material supply;**
- ▶ **Enhanced processing and commercialization capacity;**
- ▶ **Expanded consumer / market development capacity.**

The programme 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 worked recently, or are currently working, on developing the regional cassava industry. The CARICOM and OECS Secretariats will be key partners for all three components.

A fourth and overarching output is aimed at networking, and information and knowledge-sharing.

To initiate the necessary work, the institutional members of the Regional Cassava Working Group have started a number of activities. FAO provided funding to CLAYUCA to assist in the

promotion of technological and agro-industrial innovation related to cassava. On the basis of these technologies the agreement also expects the production of business profiles for different scales of production and technology systems.

CARDI, with FAO financial and technical support, is establishing plots of various sizes and different varieties under different technology systems to validate and demonstrate that the higher yields can be attained.

IICA with funding from the European Union (EU) is leading the work beyond the farm gate verifying the characteristics and size of the market as well as strengthening the organizational base of the intermediate and final product processors. This will facilitate the collaboration and coordination needed to enable bakeries and feed mills as well as intermediate product producers to increasingly utilize cassava based products. FAO and CABA are contributing partners to this work.

CARICOM Secretariat, with funding from the EU, is leading the development of a regional cassava policy with the other agencies contributing, especially from the standpoint of production, processing, marketing and consumption public policy needs.

This collaboration among all the major stakeholders in the sector will undoubtedly provide the soundest possible basis for the realization of cassava's full potential in the region.

#### For further information contact:

Food and Agriculture Organization of the United Nations  
Subregional Office for the Caribbean  
Second Floor, United Nations House  
Marine Gardens, Christ Church

BB11000 Barbados

Tel: +1 246 426-7110

Fax: +1 246 427-6075

Email: [FAO-SLC@fao.org](mailto:FAO-SLC@fao.org)

Website: [www.fao.org](http://www.fao.org)



**Food and Agriculture  
Organization of the  
United Nations**