

## **PROTECTED AGRICULTURE PROGRAMME**

### **OVERVIEW**

Protected Agriculture (PA) is defined as “*modification of the natural environment to achieve optimal growth*” (Jansen and Malter 1995). It is being viewed by several countries within the Region as a viable technology to attain a level of self-sufficiency in vegetable production and as a potential adaptation option to address the vagaries of climate change on food supply. Despite the demonstrated potential of protected agriculture, many growers have been unable to sustain and/or optimize crop yields. This is linked in part, to inappropriate designs of protected structures for the climatic conditions of the Region and production practices.

The Protected Agriculture programme of the Institute thus facilitates the development of a sustainable protected agriculture industry through the development and demonstration of appropriate production, handling and marketing technologies that span the value chain. Interventions being undertaken along the chain should assist in achieving:

- Enhanced marketing and trading systems.
- Technologies and practices for improving production, post harvest handling.
- Improved knowledge and skills of protected agriculture producers.
- Stronger producer groups and clusters to ensure vertical integration among the stakeholders along the PA value chain.
- The establishment of platforms that improve information access for key stakeholders involved in the protected agriculture industry.

### **ACTIVITIES OF NATIONAL SCOPE**

Towards the attainment of the goal, the research and development activities are being conducted to address production and marketing constraints. The programme is currently being implemented in eight of the twelve CARDI member countries; Dominica, Jamaica, Montserrat, St Kitts and Nevis, St Lucia, Trinidad and Tobago. Apart from funds from the Governments of the member states, the Institute has received funds from the Common Fund for Commodities (CFC), European Union (EU), Caribbean Development Bank (CDB) and United States Agency for International Development (USAID) to execute the activities of the programme. With the recognition that the Institute cannot achieve the goal of the programme by itself, partnerships have been fostered with national, regional and international institutions that are also seeking to develop the protected agriculture industry in the Region.

***Major Production and Marketing Constraints Addressed under the Programme:***

*Heat.* In **Jamaica and Trinidad**, economical ventilation systems are being investigated for their potential to reduce high temperatures and optimize growing conditions within protected structures. Structures are being retrofitted with appropriate roof and sidewall coverings (that can improve airflow and reduce the heat build-up), fans and misting systems.

*Media.* The potential of various soilless growing media on yield was also initiated to address the severe problems being observed in soil systems in many Caribbean countries. The performance of crops grown on these different media is being researched in **Dominica, St Lucia and St Kitts and Nevis**.

*Heat tolerant varieties.* In **St Kitts and Nevis, Trinidad and Tobago and St Lucia**, efforts will be made to address the high temperatures being experienced within structures through the evaluation of heat tolerant varieties that have acceptance in the market.

*Pests.* CARDI, **Jamaica** Unit under the USAID-sponsored Integrated Pest Management Collaborative Research Support Program (IPM CRSP) has developed a low-input protected system to reduce the impact of pests on the vegetable amaranth ("*callaloo*", "*bhagi*", "*bhaji*"). This low-input structure, "exclusion cage," can drastically reduce or negate the need for pesticide input and results in virtually no losses due to major leaf eating arthropod pests. In groups where the technology has been introduced there have been reports of a positive impact on the lives of the beneficiaries i.e. farmer empowerment and improved product quality (reduced: damage, pesticide use and post harvest treatment requirements) as well as reduced environmental pollution.

*High cost of structures.* Towards improving the accessibility of the PA technology and optimising production conditions for low resource farmers in **Tobago**, a low input, semi-protected structure that could be affordable was developed. The performance of various vegetable crops is currently being evaluated under the structure.

In an attempt to combat the adverse environment for growing crops in **Montserrat** where persistent volcanic activity has resulted in acid rain and ash, low cost hoop houses are being used to demonstrate the potential of growing crops such as sweet potato, vegetables and seasonings.

*Marketing and Economics.* In addition to technology development, data is being collected to determine the economic viability of protected systems within the Region. The Unit in **St Lucia** has been assessing the cost of producing popularly grown vegetables (tomato, cucumbers) under a protected structure by comparing it to open field production during the dry season. The information generated from these activities will enable producers to make more informed decisions that are related to the investment costs and profitability (cost and returns) of protected operations.

In **Jamaica** and **Trinidad and Tobago**, market data is also being gathered towards identifying market opportunities, facilitating supply contracts and enhancing market information systems relating to vegetables grown under protected systems. The information generated from these activities will enable producers to make more informed decisions based on the investment costs and profitability (cost and returns) of protected operations as well as increase the menu of suitable production practices for protected systems in the Caribbean.

*Groups and Clusters.* In **Jamaica** and **Trinidad and Tobago** work has been initiated to strengthen producer groups in order to assist them to capitalize on market opportunities identified within the industry. In addition, within these countries, clusters will be developed in order to improve the competitiveness of these expanding industries.

## **REGIONAL**

*Technology transfer.* Capacity building of producers and other stakeholders in the production and marketing of crops produced under PA is another area on which significant efforts are being placed. Seminars and workshops have been held across the Region focussing on constraints associated with production and marketing.

*Dissemination of information.* In support of the thrust by the Governments of the Region to promote the use of new technologies such as protected agriculture for increased agricultural productivity, CARDI and the University of the West Indies (UWI) with funding from the Technical Center for Agricultural and Rural Cooperation (CTA), produced a video "**Protected Agriculture: A New Alternative**" which primarily seeks to sensitize persons within and outside of the sector on PA technology. Specifically, the video highlights the challenges facing traditional agriculture, production and marketing benefits of PA, as well as current R&D initiatives in PA technology. This 15-minute production has been disseminated to stakeholders along the value chain and the public.

A Regional website for Protected Agriculture is being constructed. This will enable producers and other key stakeholders with easy access appropriate information in a timely manner and will also provide a platform for information exchange among stakeholders within the Industry.

### **INTERNATIONAL PARTNERSHIPS**

Towards the development of a sustainable and competitive regional protected agriculture industry, CARDI has forged relations with the Chinese Academy for Agricultural Sciences (CAAS); the premier academy in China. CAAS has 39 research institutes across 18 provinces, and has >10,000 staff members of which 7,000 are researchers. This cadre of expertise and support provides an invaluable resource for the Institute and its partners within the Region.

The relationship between the CAAS and CARDI was initiated in April 2009, when the Director General, Dr Lubiao Zhang and a four-member team of senior scientists visited CARDI Headquarters for exploratory discussions with the Executive Director to identify areas of collaboration, particularly in the area of protected agriculture. From these initial discussions, it was unanimously agreed that national/regional goals for food security and food sovereignty were the *raison d'être* for collaboration. Main areas identified for collaboration from which a Memorandum of Understanding (MOU) was crafted, included:

- i. Capacity building through (a) exchange of scholars and students, (b) exchange of genetic resources and (c) training.
- ii. Development of collaborative projects for international and regional donors.

The partnership between CARDI and the CAAS was formalized in 2009 with the signing of the MOU in Kingston, Jamaica by officials from CAAS and the Executive Director of CARDI. Subsequent to the signing of the MOU, there have been substantive collaborative efforts that have improved CARDI's capacity as well as other regional industry stakeholders in the area of protected agriculture systems development. In May 2010, the Protected Agriculture Programme Leader of the Institute visited the CAAS to participate in a workshop and study tour of China's protected agriculture industry. This was followed by two scientists from the Academy presenting a seminar on *Development of Protected Horticultural Technology in China and Greenhouse Design* to stakeholders in Trinidad and Tobago (September 2011). Short and long term exchange visits of protected agriculture specialists from the Academy and the Region will be undertaken in 2012; as the collaboration is strengthened. Key partners in the CAAS and CARDI collaboration are the Government of China and the Caribbean Development Bank; both have provided funding for the activities undertaken.