



**Complementing on-going value-added
initiatives through improvement of
infrastructure and training in elements of food
safety**

PROJECT REPORT

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Introduction

Value added processing of root and tuber crops has been taking place in the Caribbean for many centuries starting with the indigenous first people who used cassava to make a variety of products from a crude beer to baked flat bread that was used with other dishes as a staple food. In Dominica and St Vincent and the Grenadines we still have those traditional producers that are operating under conditions that are less than ideal as far as food safety and good hygiene is concerned. The project sought to ensure the presence of knowledgeable, skilful actors along the value chain by complementing on-going value-added initiatives through

improvement of infrastructure and training in Good Manufacturing Practices (GMPs) and elements of Hazard Analysis and Critical Control Point (HACCP) where practical. Early observations had indicated that HACCP was not a practical step for most of the cottage processors in the region due to the cost implications of its implementation. Furthermore, the project was to conduct demonstrations on the utilisation of value-added products and ensure the effective dissemination of successes for maximum impact.

Methodology for project intervention in Dominica and St. Vincent

In Dominica and St Vincent and the Grenadines, the following baseline survey/gap assessment activities were undertaken by the Bureau of Standards at the facilities of Stakeholder Groups along the roots and tubers value chain:

- Identify and address non-conformities.
- Identify and address training opportunities.
- General information (age, education, etc.) of operators.
- Status of facility/usage (structure type, floor type, process flow)
- Product assessment.
- Staff training (level of knowledge).
- Market penetration potential.

The results of the survey revealed the following conditions of the processors in Dominica and St Vincent and the Grenadines:

- Ownership structure was private or cooperative where the use of the facility was based on a first come first serve basis and payment for use was a percentage of the product that was made during the production cycle.
- Most of the facilities were shared (particularly in Dominica) but some were used only by the owner.
- Structures were open and ranged from dirt to concrete floors; these were considered to be environmentally inappropriate to ensure GMP's in the preparation of food-safe and quality products.
- Equipment was manual or traditional but some used crude self-constructed and power-operated equipment.
- Facilities were cleaned after use but not sanitised.
- All facilities in St Vincent and the Grenadines had water and electricity available to them and most (86%) had access to washrooms. The facilities surveyed in Dominica had no running water nor access to washrooms.

Originally, the project was intended to purchase new stainless steel modern equipment for the processors; however, based on the outcome of the survey, the decision was taken to shift the priority and address the hygiene and sanitation standards of the processors as a first step in ensuring a quality product. In general, materials and direction were provided to improve the sanitary environments of these facilities.

Methodology for project intervention in Trinidad & Tobago, Jamaica and Haiti

Stakeholder groups within the roots and tubers industry value chain in each country were selected for food safety training by the Caribbean Agricultural Development Institute (CARDI) during the course of the project. The primary objectives of the training interventions were as follows:

1. To improve the participants' knowledge and understanding of food safety.
2. To assist them in developing and implementing systems to manage food safety hazards.

Food safety assessments/gap analyses were conducted, by the HACCP Specialist Consultant (Helen Kennedy) contracted by the project, with each Stakeholder Group selected and had the following objectives:

- To determine the Group's conformance to the requirements of selected food safety schemes/standards.
- To highlight opportunities for improvement.
- To provide the Groups with recommendations for corrective action.

The selection of the specific Food Safety Schemes which were used in the assessment exercises was based on the following:

- Consistency with project objectives
- Consistency with the strategic objectives of the organisations
- The organisations' approach to Food Safety & Quality Management
- The status of the Groups' Food Safety Management Schemes (FSMS).
- Food Safety Certification of the Group.
- National and/or international recognition and acceptance of the Group.

Prior to the training sessions, a gap analysis was conducted with each Stakeholder Group and included:

- Interview of key operations and administrative personnel.
- Observation of practices at the processing facilities.
- Examination of hygienic conditions (factory and personal) at the facilities.
- Review of documentation on operations and processes.
- Examination of equipment and processes of production, product handling, packaging, labelling, transportation and marketing.
- Recording of areas of conformance and non-conformance.
- Reports, detailing opportunities for improvement and recommended corrective action, were compiled and submitted to CARDI and to the specific organisations.

Summary of main findings based on assessments/gap analyses conducted at the facilities of Stakeholder Groups selected in the three countries:

- The leadership/management teams of the target had not clearly defined strategic Food Safety objectives.
- Comprehensive FSMS has not been developed or implemented.
- Elements of FSMS had been documented and implemented, in some cases, but they require review to ensure that they comply with the requirements of a specified scheme.

- The Stakeholder groups were not HACCP-compliant nor did their FSMS conform to any Global Food Safety Initiative (GFSI) scheme.

Recommendations made were:

1. The leadership/management teams should clearly define strategic food safety objectives.
2. FSMS, based on a GFSI compliant scheme should be developed (documented), implemented (through training), maintained and continually improved.
3. The organisations are encouraged to implement GMP programmes first followed by full scale FSMS including HACCP.
4. The organisations should seek to have the implemented FSMS certified.

Training Modules used in Haiti, Jamaica and Trinidad & Tobago

Based on the above assessments/gap analyses, food safety training modules were developed. The specific elements which were included in these modules were dependent on the needs of the specific groups. The modules were as follows:

Module 1: Elements of food safety

- Food safety definitions.
- Food safety incidents.
- Types of food contamination.
- Implementation of food safety practices.
- Evolution of the food chain
- Ten food safety myths
- Importance of food safety in roots and tubers.
- Contamination hazards in roots and tubers.
- Global Gap (a voluntary international food safety standard) overview.
- *Codex alimentarius* general practices of food hygiene (GMPs)
- Prerequisite programmes.
- Introduction to HACCP.
- Seven principles of HACCP.
- Implementation of HACCP.
- FSMS documentation overview
- Development of a food safety policy
- Formatting Standard Operating Procedures (SOP)
- Formatting work instructions.

Module 2: Farm food safety

Half day training programme developed for Farmers' Associations.

- Impact of farming practices to guarantee food safety from farm to fork, contaminants. instances of food contamination and health & financial consequences.
- Good Agricultural Practices (GAPs) and food safety issues.

Module 3: Quality and food safety awareness

Half day training programme developed for roots and tubers processors.

- Introduction to food safety.
- Sources and prevention of contamination with reference to local cases.
- Food safety issues peculiar to cassava processing.
- Elements of Good Manufacturing Practices (GMPs).

Module 4: HACCP Team Training

3-5 day training programme (classroom & field trip).

- Food safety, food safety incidents and food-borne illnesses.
- Review of *codex alimentarius* general principles of food hygiene.
- Introduction to the HACCP prerequisite programmes and their implementation.
- Development of a HACCP plan.
- Construct a Flow Diagram, conduct a Hazard Analysis.
- Determine the Critical Control Points (CCPs).
- Establish the critical limits, Develop a system to monitor the CCPs.

Module 5: Good Manufacturing Practices (GMPs) and Quality Management

- GMPs as a foundation for HACCP.
- GMPs with reference to people, equipment, processes and the environment in the production process.
- GMPs for processing of roots and tubers.

Module 6: Leadership for quality and food safety

- Building a food safety culture with knowledgeable, trained and empowered staff.
- Food safety technologies, operating procedures, testing and auditing against global standards.
- Advocating for regulations and practices that raise standards across industry.
- Public education and outreach.

Module 7: Good Agricultural Practices (GAPs) with elements of food safety

- Importance of food safety in roots and tubers.
- Contamination hazards in roots and tubers.
- Food safety incidents - roots and tubers.
- Global gap overview
- Control points and compliance criteria - all farm based and crops based.
- Control points and compliance criteria for roots and tubers.

Module 8: Food safety documentation

- Food Safety Systems Manual.
- Operating policies.
- Specifications for compliance with applicable regulations.
- Work Instructions or Standard Operating Procedures (SOPs).
- Procedures for routine operations (simple or complex).
- Forms and registers.

Results of food safety training activities

Dominica (Table 1)

In September 2011, the Dominica Bureau of Standards collaborated on two food safety training sessions for 42 small cassava producers and processors focusing on the following:

- Food safety Good Manufacturing Practices (GMPs) and Quality Management.
- Fundamentals of packaging and labelling of agro-processed foods.

Two farine processing factories (Dispax and Josephine Gage) and one cassava bakery (Daniel Fredericks) were assisted in upgrading (reconstruction, processing equipment installation, stainless steel utensils supplied) toward GMP standards. The upgrades have enabled the facilities to increase their outputs by 50% and, at the same time, increasing employment in the community. It was also noticeable that the owners of the facilities required less firewood from the surrounding forests (less environmental damage) since their energy source had shifted to gas. Six workers from the three facilities attended a training session on elements of food safety.

Six other processing facilities were upgraded (supplied with processing equipment) including one processor (E. Bonnie) in the Carib Kalinago territory. Ten persons operating these facilities were formed into a cassava processing group and oriented at a training session in elements of food safety.

Table 1. Summary of the training provided and the number of individuals trained in GMPs in Dominica.

Name of Organization (Stakeholder Group)	Products	Training Programme	No. persons trained
Small cassava producers and processors		Food safety, Good Manufacturing Practices (GMPs) and Quality Management, Fundamentals of packaging and labelling of agro-processed foods.	42
Dispax Group, Josephine Gage, Daniel Cassava Bread	Farine, cassava bread	Elements of food safety	6
Cassava Processing Group (Kalinago Territory)	Farine	Elements of food safety	10
TOTAL number of persons trained			58

St. Vincent & the Grenadines

Five value-added cassava farine processing facilities of Percy Dean, Garnet Dean, Cecelia Jack, Malcolm Knight and, Fancy Cooperative, were upgraded (reconstruction and equipment installation) to GMP standards and have since increased their outputs by over 40%.

Under arrangement by the project, 25 processors (farine) were trained in Food Safety by the St. Vincent Bureau of Standards. All beneficiaries reported improved production and improved quality of product after the training.

Haiti (Table 2)

Though no upgrades have taken place it is anticipated that the conditions will be very similar and the focus will have to be on the improvement of hygienic standards.

Since HACCP training for RT value-added production in Haiti was recognized as critical, in Aug 2012, a GMP training needs assessment was conducted in August 2012 with small processing groups in Les Cayes and Salagnac by the HACCP Consultant and 19 processors and University students were trained in GMPs.

The project team also trained 12 small village bakers producing breads and cakes with mixtures of wheat and cassava flour, in elements of food safety. The bakers were substituting cassava flour for 50% of wheat flour which is increasing in price in local and global markets.

Table 2. Summary of food safety training in Haiti, 2012.

Name of Organization (Stakeholder Group)	Products	Training Programme	No. of persons trained
1. Organisation Des Planteurs De Mailloux, Gaita Et Troirac (OPMAGAT) 2. Asosyasyon Tèt Ansanm Laval (ATAL) 3. University Students <ul style="list-style-type: none">• State University• University Notre Dame D'Haiti• University UPSEJ (Jacmel, Haiti)	Cassava bread, farine, cassava flour.	Good Manufacturing Practices (GMPs)	19
Small independent village bakers	Cassava/wheat bread	Elements of food safety	12
TOTAL number of persons trained			31

Jamaica (Table 3)

Supply and installation of oven drying racks and the installation of a hammer mill were facilitated by the project thereby allowing for greater cassava Bammy production and the expansion of the product line to include increased volumes of pancake mixes and cassava flour blends. Linkages were also established with cassava producer groups to increase the supply of fresh cassava to the factory.

In April 2012, three Processor Groups (Twickenham Industries, Bomacks and, the United Greenhouse Growers Cooperative Association) consisting of 20 persons, were trained by the Jamaica Bureau of Standards in “Elements of Food Safety”.

In August 2012 and March 2013, a total of 51 personnel (including 12 producers and 20 processors from Twickenham Industries, Mello Bammies and, Central Packers, 12 farmers from Groups established by the project and, seven Extension Officers) were trained in GMPs. Food safety gap analyses were conducted at the Twickenham and Central Packers factories.

In March 2013, a one day training programme in Food Safety Documentation was conducted for a group comprising 18 workers from Twickenham Bammy Industries, Mello Bammies and Central Packers Limited.

In June 2013, the Regional HACCP Specialist conducted a food safety workshop on GMPs at the Training Facility of Twickenham Industries Ltd. for 16 producers representing Bernard Lodge, Tate, St Thomas and Coco Walk Farmers’ Associations. She also conducted a follow-up Food Safety Assessment at the Twickenham Industries Bammy factory.

Table 3. Summary of the training provided and the number of individuals trained in various aspects of food safety in Jamaica.

Name of Organization (Stakeholder Group)	Products	Training Programme	No. of persons trained
Twickenham Industries, Bomacks and, the United Greenhouse Growers Cooperative Association	Bammy, cassava pancake mix, cassava flour, farine,	Elements of food safety	20
1. Twickenham farmers 2. Roots and tubers producers representing Bernard Lodge, Tate, St Thomas and Coco Walk. 3. Extension Officers	Cassava and sweet potato (no value addition)	Farm Food Safety	51
1. Twickenham Industries processors. 2. Mello Bammies. 3. Central Packers 4. Farmers from Groups Bernard Lodge,	Bammy, cassava pancake mix, cassava flour, farine, gari (fermented product)	Food Safety In A Nutshell. Food safety documentation.	18
1. Bernard Lodge United Progressive Farmers' Association 2. Tate Community Development Group 3. St. Thomas Women's Agricultural Initiative 4. Coco Walk South Manchester United Farmers Association		Good agricultural practices with elements of food safety	16
TOTAL number of persons trained			105

Trinidad & Tobago (Table 4)

This was the only project country that had a processing facility that had the potential to attain HACCP standards; however, due to the timeframe and the significant investment required, it was decided that improvement of food safety standards by implementing GMP's would be the best approach. In addition, the project provided two washer/peelers so that the throughput of cassava and sweet potato could be increased. This increase allowed the facility to partner with an international fast food restaurant chain in Trinidad and Tobago to test market sweet potato fries.

A GAPs course was developed on marketing record keeping, growth and development of RT crops, propagation techniques, crop care, harvest and postharvest, food safety management systems and value-added product development. This course was delivered at twenty GAPs training workshops at which 246 producers were trained (132 cassava; 114 sweet potato). Assessments indicated an increase in knowledge and skills.

Two washer/peelers supplied by the project to the Trinidad & Tobago Agribusiness Association (TTABA) and the Tobago House of Assembly (THA) Marketing Division have resulted in the production and marketing of several value-added products from sweet potato and cassava.

Follow-up assessments were conducted at two processing organisations, TTABA and the THA Marketing Division, to determine the progress made in the establishment of a comprehensive Food Safety Management System following training received by the HACCP Monitoring Professional in 2012. Neither organisation was considered to be HACCP-compliant nor to be in conformance to the requirements of Food Safety System Certification (i.e. ISO 22000).

Training was conducted for 25 farmers in Tobago in Good Agricultural Practices (GAPs) that included elements of food safety..

Altogether, 297 producers, processors/workers in processing plants of TTABA, THA Marketing Division and, farine producer groups in Tobago were trained in aspects of HACCP/GMPs and appropriate Food Safety Management Systems (FSMS) identified (with gap analyses) for these plants.

Table 4. Summary of the training provided and the number of individuals trained in GMPs in Trinidad & Tobago.

Name of Organization (Stakeholder Group)	Products	Training Programme	No. persons trained
1. TTABA 2. Louis D'or Processing Unit	Sweet potato fries, cassava fries, raw grated cassava, frozen cassava and sweet potato, cassava flour, farine, cassava/wheat bread, sweet potato/wheat bread, yam/wheat bread.	Leadership for quality and food safety	21
1. TTABA 2. Louis D'or Processing Unit		Quality and food safety awareness	194
1. TTABA 2. Louis D'or Processing Unit		HACCP team training	23
1. Cunupia Farmers Association 2. Rio Claro Cassava Farmers Group 3. Tobago farmers	Fresh sweet potato (no value addition) Fresh cassava (no value addition)	Farm food safety	39
1. Louis D'or Processing Unit 2. Cassava Products Company Limited, THA	Cassava flour, farine	Quality and food safety, Good Manufacturing Practices (GMPs)	20
TOTAL number of persons trained			297

Total number of Stakeholders trained in food safety in the project countries

Altogether, under the project, 516 producers, processors, bakers, technicians, University students, and Extension Officers have been trained in several aspects of food safety in Dominica (58), St. Vincent (25), Haiti (31), Jamaica (105) and Trinidad & Tobago (297).

Lessons learnt/challenges

- Leadership/management commitment to food safety was not always strong; they often simply saw this as an additional cost that did not have to be done simply because of the lack of enforcement in many of the islands.
- Attendance at training sessions was often not good especially for upper managers; however, the floor managers and line personnel were always well represented.
- Literacy of participants and language barriers was often a problem. This was mainly an issue in Haiti especially when they were required to complete pre- and post- training questionnaires.
- Training facilities were often inadequate and uncomfortable and, in some cases, training had to be conducted outdoors.

The way forward

- St Vincent & Dominica
 - After a period of about six months, conduct another GAP analysis of processors.
 - Development of an implementation plan.
 - Nurturing programme to assist processors in implementation of GMPs.
 - Business and book-keeping training to help determine the impact of the training on their operations.
- Periodic review to determine organisations' progress in developing and implementing the Food Safety Management System.
- Assistance in the development of detailed Project Plans for the development and implementation of the FSMS (inclusive of GAP, GMP and HACCP where applicable) and in project management.
- Assistance in addressing some of the identified non-conformances and opportunities for improvement.
- Training in development of FSMS documentation.
- Internal Auditor training.
- Lead Auditor training.

ANNEX I – Value-added Infrastructure developed under the project.



Dominica
Cassava farine factory
at Tranto/Dispax



Jamaica

Supply of oven racks and installation of a mill for Twickenham Bammy Industries resulted in 300% increase in demand for fresh cassava raw material and links to producer groups in St. Catherine and St. Thomas.



Trinidad & Tobago

2 washer peelers supplied by project has resulted in several VA products from sweet potato and cassava



ANNEX II – Stakeholder Groups trained in food safety under the project



OPMAGAT and ATAL

HAITI



Small producers of cassava/wheat bread





Twickenham Bammy Industries

Jamaica



Roots & Tubers Farmers' Groups



Trinidad & Tobago Agribusiness Association

Trinidad & Tobago



Farmers' Groups from Cunupia, Rio Claro and Tobago



Louis D'or Processing Unit