

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Safety - Food Safety, Science, Technology and Childhood Obesity (FOSTCO)

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies			38%	
503	Quality Maintenance in Storing and Marketing Food Products			12%	
504	Home and Commercial Food Service			25%	
701	Nutrient Composition of Food			25%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	4.0	0.0
Actual Paid Professional	0.0	0.0	0.9	0.0
Actual Volunteer	0.0	0.0	0.5	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	86876	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	58069	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The mission of the FOSTCO program is to promote the quality of life and economic viability of the agricultural sector and rural communities by continuous improvement of current and development of new food and non-food products and their respective manufacturing and other related processes. In so doing, the Program considers such aspects as food safety, nutritional value, environmental impact, needs for education and information dissemination, consumer and industry support, and technology development, transfer and adaptation.

In order to accomplish our mission, during this year a total of nine seminars were offered on the Food Safety Program. Educational programs were conducted in food safety and related topics (GMP, GAP, HACCO and SQF) and a total of approximately 150 persons attended the seminars. In an effort to help the food industry in the improvement and development of new food, a total of 20 industries contacted us requiring some type of collaboration. The collaboration with the industry included chemical and/or microbiological analysis of food, nutritional fact analysis, physico-chemical properties of food and literature search. A project on the Impact of Current Packaging Technologies on the Quality of Minimally Processed Tropical Pumpkin was initiated and the first part of the edible film project ended. This project was conducted to help food industry to extend the shelf live of fresh peeled orange. The results show that is possible to extend it to 30 days at refrigerated temperature using an edible film with a preservative. Another project focused in the development of a minimally processed tropical fruits ended with the production of a fruit salad, which have 25 days of shelf life. Two theses were published: one related to extraction of pectin from mango (mayaguezano variety) and another one on development of edible films with bacteriophages. Two posters were presented on the Annual Meeting of the Institute of Food Technology (Scientific Program).

2. Brief description of the target audience

- Extension Specialists and Agents
- Academic Programs Faculty
- Consumers
- Federal and State Agricultural Agencies (PRDA)
- Food Industry representatives

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of Courses, seminars and workshops offered on the topics covered by the Program

Year	Actual
2013	9

Output #2

Output Measure

- Number of projects or industry collaboration agreements established

Year	Actual
2013	20

Output #3

Output Measure

- Number of people attending seminars and workshops

Year	Actual
2013	120

Output #4

Output Measure

- Amount of grant funds (internal or external) of active projects

Year	Actual
2013	76000

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Total Number of Enterprises Impacted by the Program.
2	Food Manufacturing Exports in million dollars
3	Food Manufacturing Imports in million dollars.
4	Number of improvement or development projects focused on safety or nutritional aspects of product or production processes
5	Number of projects on postharvest or packaging
6	Number of projects focusing on definition of quality parameters
7	Number of projects dealing with residues, wastes or effluents

Outcome #1

1. Outcome Measures

Total Number of Enterprises Impacted by the Program.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	20

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The literature reports improper postharvest practices as a main contributor to product losses and quality deteriorations. It is important that food producers understand and adopt food safety practices. Puerto Rico producers need to pay particular attention to management and handling practices after harvest if we are to seriously address food security issues.

What has been done

Different types of physical, chemical and microbiological analysis were conducted to 18 food products. In addition, nutritional facts were developed for 27 new products. Some of the food Industries that requested our services came as part of an agreement between the Food Science and Technology Program and Puerto Rico Industry Development Corporation (PRIDCO). A total of approximately 9 seminars were conducted in food safety areas such as GMP, HACCP, and GAP. A project in current packaging technologies on quality of minimally processed tropical pumpkin was initiated.

Results

Twenty different food Industries were attended in the program and seven of them obtained the Health Department license to start the production of food products. Approximately 120 food industry employees (food processors and farmers) were trained in food safety. A project on edible films provided data and experience to help the citrus industry in Puerto Rico.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
503	Quality Maintenance in Storing and Marketing Food Products

504 Home and Commercial Food Service
701 Nutrient Composition of Food

Outcome #2

1. Outcome Measures

Food Manufacturing Exports in million dollars

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Food Manufacturing Imports in million dollars.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of improvement or development projects focused on safety or nutritional aspects of product or production processes

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Coffee remains one of the top economically important enterprises of Puerto Rico. This industry faces several important challenges such as the shortage of labor, increases in production costs, reduced government contributions, and control of the coffee berry borer, considered the worst pest of this crop. It is necessary to establish and promote new strategies to increase the profits of the industry.

What has been done

Agricultural engineers and food scientists collaborating with this program are working in the development of more efficient methods to produce dry parchment coffee, taking under consideration the climatic conditions of Puerto Rico. They are also developing high quality coffee cordials and schnapps from locally harvested coffee.

Results

The results showed that the drying temperature has a significant effect on energy consumption and drying time. Contrary to expectations, the use of high temperatures during the first stage of the drying of parchment coffee promotes a more efficient process. At the second stage of drying the use of higher or lower temperatures had no significant effect. Lower temperatures are therefore recommended to avoid overheating of coffee grains, which could affect the product's overall quality. It is expected that the adoption of more efficient drying recommendations will help reduce the high energy costs incurred in coffee drying operations. A coffee cordial was also successfully formulated using coffee aroma extracts obtained from extractive distillation methods with vapor infusion of ethanol. The commercialization of this product will help to increase the available markets for the specialty gourmet coffee elaborated in Puerto Rico.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
503	Quality Maintenance in Storing and Marketing Food Products
701	Nutrient Composition of Food

Outcome #5

1. Outcome Measures

Number of projects on postharvest or packaging

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Minimally processed fruits and vegetables consist of raw fresh cut produce, which have undergone a minimal processing such as peeling, slicing or shredding to make them ready-to-use. Convenience foods preserved by mild methods are one of the strategies being developed to increase the consumption of local crops by time-challenged consumers.

What has been done

Studies have been conducted to prolong the shelf life of peeled orange fruits at refrigerated temperature by using edible films, and of low-density polyethylene (LDPE) bags as a packing material that could be used to maintain the quality of pumpkin pieces in storage. The PRAEXS developed 'Taina Dorada' variety was used for the latter study.

Results

The use of edible films proved to be a viable method to extend the shelf life of peeled oranges. The peeled orange coated with hydroxymethyl cellulose and potassium sorbate had the best appearance at the end of 28 days of storage, with no effect observed on the fruit's physico-chemical characteristics or color attributes. In the case of pumpkins, results showed that at a temperature of 4°C, pumpkin pieces treated with an antimicrobial solution and sealed with and without vacuum in LDPE bags, can be maintained for 20 days in a condition acceptable to consumers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
503	Quality Maintenance in Storing and Marketing Food Products

Outcome #6

1. Outcome Measures

Number of projects focusing on definition of quality parameters

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

One of the research priorities resulting from the program evaluation survey conducted at last year's coffee commodity meeting and technology forum was the need to characterize the quality of coffee beans according to their production zone in Puerto Rico. Sixty-percent of the surveyed participants included this research need in their assessment. Objective criteria to establish the quality of particular coffees is critical for the development of a gourmet specialty coffee sector in Puerto Rico with the certified quality to command higher prices for its produce.

What has been done

A research project on the chemical characterization of coffee was approved and is being conducted. The quality of coffee is largely dependent on factors such as temperature, climate and altitude. The chemical characterization of coffee produced at different altitudes is a useful tool to associate the sensory properties of a product with the specific families of compounds present in them. The research design includes the evaluation of two coffee varieties grown at two distinct altitude zones.

Results

Preliminary results show that the effect of height and variety is significant, which may affect the organoleptic quality of coffee grown in Puerto Rico. The associated benefits from this research are: 1) the establishment of a data bank of chemical precursors of aromas and flavors of both coffee varieties at selected regions, 2) the quantification of differences in terms of chemical precursors of aroma and flavors in coffee, and 3) the development of a tool to identify the best cultural practices for specialty coffees and associated performance criteria.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
701	Nutrient Composition of Food

Outcome #7

1. Outcome Measures

Number of projects dealing with residues, wastes or effluents

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Competing Programmatic Challenges

Brief Explanation

Economy - Puerto Rico is currently suffering the economic recession affecting the rest

of the world. Although it is expected for the economy to pick up, while the recession prevails, the amount of funding available to invest in research or new ventures will be limited.

Competing programmatic challenges - Program resources are not dedicated to the program. Instead, they belong to other departments and they need to address issues as their respective programs so require. Thus, we have a pool of researchers who are constantly entering and leaving.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

In order to fulfill our mission and to adapt research and new knowledge to Puerto Rico's food industry and agriculture, the Food Safety, Science, and Technology Programmatic area was evaluated. A small survey was conducted. The questionnaire was answered by 70 people including: farmers, agronomists, private industries, Puerto Rico Department of Agriculture employees, members of the College of Agricultural Science teaching faculty, Experiment Station scientists and Agriculture Extension Service personnel.

The results of the evaluation indicate that participants believe that the Food Safety, Science and Technology area needs to perform research on: 1) use of new or improved existing technologies for processing and to extend the shelf life of agricultural crops, 2) post-harvest treatment of crops, 3) new product development using Puerto Rico's traditional crops as raw material, 4) risk assessment on possible chemical contaminants in food sold to Puerto Rican consumers (including imports), 5) quality assurance during storage and distribution of fresh produce, 6) determination of new quality cultivars with economical potential in our land. While some of these research lines are already present in our program, others will be evaluated for inclusion if more human and financial resources become available in the future.

To improve the performance of the Program, a series of questionnaires' will be prepared to collect more specific stakeholders input. This information will help to identify areas where the Program may be improved and as a tool to measure its progress.

Key Items of Evaluation

The results of the evaluation indicate that participants believe that the Food Safety, Science and Technology area needs to perform research on: 1) use of new or improved existing technologies for processing and to extend the shelf life of agricultural crops, 2) post-harvest treatment of crops, 3) new product development using Puerto Rico's traditional crops as raw material, 4) risk assessment on possible chemical contaminants in food sold to Puerto Rican consumers (including imports), 5) quality assurance during storage and distribution of fresh produce, 6) determination of new quality cultivars with economical potential in our land. While some of these research lines are already present in our program, others will be evaluated for inclusion if more human and financial resources become available in the future.