

# 2015 University of Puerto Rico Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 06/24/2016

## I. Report Overview

### 1. Executive Summary

This accomplishments report covers the period from October 1, 2014 to September 30, 2015. It is the first combined annual report submitted by the Puerto Rico Agricultural Experiment Station (PRAEXS) and the Puerto Rico Agricultural Extension Service (PRAES). During this fiscal year, PRAES dedicated 167.42 FTE's to our programs, an increase of 6.11 FTE's over the 161.31 used for FY 2014 due to hiring of new personnel. In the case of the PRAEXS the total FTE/SY effort supporting our programs in FY 2015 was 55.5. This includes a significant amount of volunteer effort by our faculty to reach our goals. In the planned programs reports, however, only Hatch and Hatch Multistate FTEs are included. The seven initial programs in this report are PRAES and PRAEXS combined planned programs while the last four are solely extension oriented.

#### 1. Plant Production Systems, Genetic Resources and Breeding Program

Citrus Greening (CG) is a disease that has severely affected citrus production. Forty-eight percent (48%) of growers who were trained in CG management adopted a scheduled fertilization and insecticide application program. Educational activities were offered to increase production of vegetables at the local level. A total of 6,465 persons either completed a short course or received training on the subject; 34% of the participants established a vegetable garden.

Research conducted under this program is at the core of PRAEXS efforts to improve food security in Puerto Rico and other tropical regions of the world. During FY 2015, work continued on the acquisition, evaluation, conservation and distribution of plant germplasm. New sweet chili pepper lines, and bean germplasm were released. Several bean diseases (BGMV, BCMV, and BCMNV) are no longer serious in Puerto Rico due, in large part, to the release and dissemination of resistant cultivars. Five sweet potato clones of the tropical type were selected for further testing for commercial production. Clones were selected for tolerance to a light stress of water deficit. The land area planted with improved varieties has been increasing over the past few years. The Isabela Substation sold 6,828 pounds of beans, 1,384 pounds of corn, 94 pounds of tropical squash, 276 pounds of pigeon peas, and 122 pounds of coriander to growers in 2015. The Adjuntas Substation sold 8,585 pounds of coffee seeds, 34,500 coffee seedlings and 2,635 citrus seedlings. In 2015, the program engaged 8.8 paid FTE/SY and was responsible for 23.9% of total Hatch/match funds spent in our programs.

#### 2. Animal Systems

In two Extension outcomes, a decrease in the number of farmers adopting practices, compared to the previous year, was observed. In outcome 4, a 38% decrease (22 vs. 50%) in the number of farmers adopting parasites control practices on their farms was recorded. This could be attributed to an effective parasite control in previous years. A 7% decrease (47 vs. 40%) in the number of farmers and agricultural entrepreneurs that used economic tools to make effective economic decisions to improve their business was also observed (outcome 7).

On the research side, the program continued supporting local dairy industry and beef cattle production by managing the dairy herd at the Lajas PRAEXS and the research component at the Montaña Beef Cattle Research and Teaching Farm. Accomplishments include the performance of silage evaluations of several sorghum varieties and trials for an evaluation of the level and type of concentrate supplementation of dairy cows fed with tropical forages. Research focused in providing genetic improvements towards heat tolerance in bovine cattle also continued. At the Montaña farm, research on beef cattle genetics, physiology, nutrition, growth, and beef quality is carried out, while providing UPR-College of Agricultural Sciences (CAS) purebred registered Senepol cattle of high genetic merit to local cattlemen. Beef cattle producers in Puerto Rico need to improve the genetic composition of their herds to increase their share of consumer markets, based on the high quality of their meat. In 2015 PRAEXS allocated 3.3 paid FTE/SY to this program, which accounted for 31.8% of the total Hatch/Match funds spent on our planned programs.

### 3. Integrated Management of New and Emerging Pests and Diseases

In 2015 significant progress was achieved in the combined research and extension activities planned to disseminate results and management information on Citrus Greening among citrus growers. The PRAEXS Citrus Program joined the Citrus Clean Plant Network (CCPN) thus strengthening the production of disease free citrus plants in Puerto Rico. A new Extension Vegetable Specialist was recruited and provided training and counseling in vegetable production. More than half (61%) of the persons completing a course in vegetable gardening learned about IPM while more than a thousand (1,234) persons reduced the incidence of pests and diseases in vegetable gardens by using IPM. In addition, the diagnostic capacity at the Plant Diagnostic Clinics has been enhanced, with routinely use of ELISA tests and Lateral Flow Devices (LFD) for specific viruses, bacterial, and fungal pathogens. The PDCs have also expanded the use of specific lab tests such as PCR and other DNA-based methods for pathogen identification. Timely pathogen and insect identification are essential for disease and pest management decision-making.

Research in the use of alternative practices to control nematodes in *Musa sp.* continued. New investigations were initiated based on input from clientele and Extension Agents to determine the effect of shade houses in managing key pests of cabbage, pepper and lettuce. Thirty percent of PRAEXS total Hatch formula and matching funds expended were accounted for by this program which also engaged 2.8 paid FTE/SY.

### 4. Climate Change, Natural Resources and Environment

In 2015, the State Fire Department launched an aggressive educational campaign known as "Puerto Rico frente al fuego" using Extension educational materials. So far, 43% of people who received capacity development training on brush fire prevention adopted one or more of the recommended practices. Seventy nine percent (79%) of the training participants improved water collection, storage and water reuse efficiency. An intergovernmental committee was created to develop a strategic drought plan in which PRAES is a contributor. We continue to collaborate with the Caribbean Area Climate Change Hub, and also with FS to develop the Caribbean Cohesive Wildfire Management Action Plan.

Last year PRAEXS completed studies to determine numeric nutrient criteria and biological indicators of stressor conditions for reservoirs in Puerto Rico. Results confirmed previous estimates using a biological index component. The PR Environmental Quality Board recently modified its local Water Quality Standards of Rivers and Streams, based in part, on these results. Multidisciplinary research continues to develop understanding and efficient technology for water conservation and management in crops such as vegetables and coffee, and for dairy farms. The development of a website and a mobile application for scheduling irrigation on the island is providing vital information for irrigation needs in different agricultural areas. PRAEXS allocated 3.1 paid FTE/SY and spent 11.7% of its total Hatch/match expenditures in 2015

in this program.

#### 5. Food Safety, Science and Technology

Consumers should be informed about safe food handling practices at home to lower the risk of foodborne illness. PRAES Home Economists offer Families Be Food Safe curriculum. A total of 1,224 consumers completed the curriculum. Seventy eight percent (78%) of the participants adopted at least one safe food handling practice. The PR Health Department requires that food managers take the food safety course every three years to keep up-to-date on changes in the regulation. The PRAES course complies with Food Code requirements. Participants must score 70% or more to pass the test. A total of 3,299 Food Managers completed the food safety course. Ninety nine percent (99%) passed the food safety course test scoring 70% or more.

In 2015, the PRAEXS faculty offered four seminars on food safety and related topics (HACCP, SQF, GAP and GMP). Nearly 60 food industry employees and farmers were trained. In addition, Nutritional Fact Analysis and other type of analysis were conducted, fulfilling the requests of 14 industries. Research continued on the development of new products using food industry wastes, and from traditional agricultural commodities. For example, acid whey was successfully used to formulate a yogurt and a frozen dessert. Another project evaluated the physicochemical and nutritional quality of flowers and immature fruits of locally adapted pumpkins for introduction into the local gastronomy. In FY 2015, PRAEXS dedicated 1.4 FTE/SY to this program; funds expended amounted to 1.1% of total Hatch/match funds.

#### 6. Community Resources for Sustainable Development, Agricultural Economics, Marketing, and Added Value

Puerto Rico's CRD followed up on potential community entrepreneurs, with participants who had already trained in "The Community Entrepreneurial Tool Box" in previous years. A total of 158 persons reported having benefited from emerging economic initiatives. Also, direct mentoring by PRAES field personnel led to the establishment of vocational and entrepreneurial initiatives for female heads of households in the towns of Hatillo and San Sebastián and the "rescue" of vocational agricultural programs. Their actions also led to the creation of a community agricultural reserve in the town of Las Piedras, which protected more than 900 acres of prime farmland in El Yunque National Rain Forest buffer zone from an urban development project. A 20% increase in new community projects was reported in comparison to last year's results.

On the research side, a study on the impact of "Family Markets", a type of farmers' market sponsored by the PR Dept. of Agriculture and the PR Family Dept. with USDA support, was completed. Participating farmers, market administrators and a sample of consumers supporting the markets were interviewed on the markets' performance and contribution to the local economy. Preliminary results suggest the markets have been highly successful, making a positive impact on employment, providing small and mid-sized farmers with access to another marketing channel, and giving SNAP and WIC consumers access to high quality produce at good prices. Based in part on these results federal support for the Family Markets initiative was continued. In addition, research on public policy issues continued with a literature review of land use policies and program restructuring in land grant institutions over the last two decades. This program, however, engages only 0.6 paid FTE/SY and is responsible for 1.2% of Hatch/match total funds.

#### 7. Sustainable Energy

The high cost of energy in Puerto Rico remains a big issue. To reduce this cost, the Gurabo Agricultural Extension Agent offered assistance to a farmer on the efficient use of energy, particularly the use of photovoltaic solar energy at home and in a greenhouse irrigation system. The farmer established a photovoltaic solar energy system with 10.0 Kw capacity, producing the energy consumed at home and in the business on the roof of their home. In another example, a dairy farmer in Hatillo established a 53.0 kW photovoltaic solar system at the dairy facilities, covering all of the farm's energy needs. This system reduced the farm energy bill from \$1,200 to \$10.00 per month, an annual savings of \$14,280.00.

In 2015 PRAEXS did not have any active research project in this program. However, one faculty researcher submitted a new externally funded proposal, related to energy generation and nutrient recovery from agricultural wastes and optimization of biodigesters designs, which was approved. Although no Hatch-funded proposal was submitted, we have opted to keep this program in our POW with the expectation that formula funded projects in this area can be initiated in the future.

#### 8. Adult and Childhood Obesity

A nutrition education curriculum was designed to promote healthy eating and physical activity for school-aged children and teens. A 55% increase in healthy food selection in children and youth who participated in nutrition education courses. In addition, 48% of children and youth reduced the intake of sugary beverages and a 52% increase was reported in the consumption of water. Also a complete nutrition education and physical education curriculum was designed for adults and caregivers. Eighty percent (80%) of the adults who completed the nutrition education course successfully adopted healthy eating habits. Following nutrition education, 68% of adults and caregivers ate more fruits and vegetables than before education. There was a 78% increase in water consumption.

#### 9. Family Well-being

A state level family violence prevention campaign was developed. Two-hundred-forty-three (243) collaborations were established. Eleven thousand four-hundred-twenty-one (11,421) women and families benefited of the educational campaigns and workshops. Eight hundred sixteen (816) parents improved parenting skills. A curriculum was developed for people 65 or older to provide education where 1,597 elder people benefited. They gained knowledge and skills on the importance of a good mental health, and how to prevent depression. One hundred eighty-six (186) reported an improvement of their self-esteem. The participants highly recommended the program to other people. Also, 69% of the Consumer Education course participants adopted recommended saving practices through goods and services selection.

#### 10. Strengthening Youth Life Skills, Leadership and their Community

Through a collaborative project with PR Health Department and UPR Comprehensive Cancer Center 55 4-H leaders were trained to be spokespersons for two important health campaigns: How to prevent VPH and Water vs Sweet Beverages. Fifty teen-teachers were trained to deliver healthy lifestyle initiatives in communities and schools, sponsored by 4-H National Council and Wal-Mart Foundation. Other 25 youth sponsored by US Forest Service-Children Forest were trained to understand the impact of climate change in El Yunque National Rainforest to deliver this information to the community. In addition, the National State Conference is our platform to develop and reinforce communication skills. Eight youth leaders become the voices and faces of a TV commercial and for a radio campaign. The 125 youth participating in 4-H State Conference had the opportunity to reinforce their communication skills. In addition, 3,812 children and youth participated in diverse educational programs designed to teach basic life skills.

#### 11. Global Food Security and Hunger

In 2015, 14 community gardens around the island were established as a result of an agreement with the Federal Strike Force (Nutrition Service, Rural Community Development, NRCS, FSA, RD and the State Department of Agriculture). This group provided the funds while PRAES was in charge of the know how and the education component. In 2016, we expect to expand this effort. Islandwide, PRAES Agricultural program area, 1,897 gardens were established at the household, school and community level.

#### PRAES EVALUATION OF MULTI JOINT ACTIVITIES

1) How will the planned program address the critical issues of strategic importance, including those identified by the stakeholders?

Critical important issues will continue to be addressed in PRAES through the five national initiatives

and were integrated across the four program areas. In addition, the Local PRAES Advisory Committees are a main mechanism to identify local needs of our stakeholders in the municipalities. These needs are addressed locally in the plan of work. Most of these issues are already incorporated as part of our planned programs.

The Merit Review process, conducted for each program area, also provides an additional perspective to the needs of our stakeholders, as numerous agencies and groups working with similar audiences contribute to the need. In the area of agriculture, commodity meetings provided a more specific identification of critical issues. Meetings are conducted for every commodity with farmer's participation, Extension agents and researchers from the Agricultural Experiment Station. Extension specialists become key contacts between PRAES and the Experimental Station. During these gatherings, critical issues are discussed and strategies are defined to address these issues.

This year Merit Review meetings bring about a broad issue discussion. Besides the introduction of new pests and diseases as an important critical issue in the agriculture program, training in biosecurity, record keeping, forage alternatives for animal feeding and economic strategies were identified. Attaining food security for Puerto Rico is a work in progress that will be continuously pursued due to low domestic production, continued loss of agricultural land and high dependency on food imports. PRAES help farmers, agro entrepreneurs, and the general public understand the threats to our food security and to identify strategies to attend these threats.

Within the Family and Consumer Science program identified critical issues are health issues and obesity where 27.9% of the population is considered as obese or overweight. The low consumption of healthy foods such as fruits and vegetables is seen in this group. The nutrition education program developed education to reduce the consumption of sugary drinks. Followed by an education curriculum, "hands -on" activities and teaching about physical activity. The elderly population in Puerto Rico is growing at a higher rate. This population group faces a range of health (physical, emotional), and social problems to meet their needs. A curriculum on elder aspects was developed where 1,597 elder people benefited. In recent years an increase of family violence in Puerto Rico has been reported. To attend this issue, a family violence prevention campaign at state level was implemented.

Effective and constant communication with youth, volunteers and staff provides us with the opportunity to evaluate and reflect on way to design a responsive program at the local, regional and state level. Regularly the PR 4H program meets with stakeholders to conduct a merit review process and maintains ongoing youth consultation. Our program allows our 4H youth the opportunity to be an active sector to invigorate our objectives and goals. This year one critical issue identified was the importance of improving communication skills in youth to help deliver educational messages to different audiences. Our sponsors and collaborators from different governmental agencies and community groups agree in the statement that youth comprehend how their voices can be a powerful tool to become a community leader and make an impact in their communities. They undertake their role as leaders and spokespersons with greater commitment. PR 4-H program organized and offers strategies that provide youth the opportunity to develop communication skills to address this critical issue.

Community Resource Development (CRD) program conducted both, stakeholders and merit reviews to inquire our community and agencies collaborators which issues are of utmost importance in the search for community development and prosperity. Both processes were held separately, the most pressing issue presented by community leaders and sister agencies was the need to promote economic activity by taking advantage of the skills and opportunities present in the community setting. Due to Puerto Rico lasting and pressing economic crisis, most participants in both processes placed economic development as the panacea that will allow advancement in other areas such as reduction of criminal activity and violence.

2) How will the planned programs address the needs of under-served and under-represented population of

the states?

To increase knowledge and adoption of recommended practices in food production as well as nutrition, an Alliance was formed among USDA agencies (Food Nutrition Service, USDA-NRCS and USDA-Rural Development) and PRAES called "Strike Force Community Garden". This effort was conducted during the summer month in low income residential areas. Fourteen (14) gardens to support agriculture, nutrition and health education in low income public housing projects were established. Special attention was given to kids and youth that also aid to encourage the enrollment of new 4-H members and volunteers. This effort reached 3,134 kids and youth who gained knowledge on Food Systems and Food Security. It also provided means to identify sponsors and partners to support our work with youth with disabilities and low income kids and youth. Some of our partners were DOW Company, who gave a donation to establish schools and community gardens in municipalities at the southern part of PR. This initiative was developed during school year period.

Close to 50% of the Puerto Rican Population and 63% of children under the age of 12 lives in extreme poverty. Accordingly, serving this underserved population is the focus of our CRD program. Our educational program centers in training community members in business design and planning. Among the principal participants are women, disadvantaged farmers and community service providers.

### 3. How will the planned programs describe the expected outcomes and impacts?

Every planned program at PRAES describes the expected outcome and impacts through outcome indicators reported in the Electronic Reporting System that collects data throughout the state. Impacts are collected through local and state success stories and reported in the section of Impact Statements of the Annual Report. Most of the planned programs reported, at least one impact statement which focused on outcomes or changes in action and conditions.

Overall, the Agricultural planned programs outcomes focused on: percentage of farmers adopting recommended practices, improvement in the quality of the products, increases in market share of local produce and increases in local agriculture production.

Protection of farm land is a big issue under the CRD program. After nine long years of implementing different educational methodologies and strategies; mainly using the PRAES curriculum Communities to the rescue of land; local leaders, farmers, Soil Conservation District and the local Ag Agent collaborated helping in the organization of farmer's organizations and documenting the need to protect 900 acres who are prime land surrounding the El Yunque National Forest buffer zone against the urban sprawl.

The 4H program in Puerto Rico is designed to provide youth with positive opportunities to learn and interact with peers and adults, leadership development and focus on the enhancement of life skills to prevent negative high risk environments. Through the 4H state projects or initiatives: Route for Healthy Living, Food Systems and Food Security, Media Detective... a drug and alcohol Prevention program, and 4-H spokespersons and Teen as teacher project we designed opportunities and activities to learn and empower life skills needed for everyone to succeed.

### 4. How will the planned program result in improved program effectiveness and/or efficiency?

PRAES planned programs continued to improve their efficiency through collaborative multi-institutional efforts with major agencies and institutions that work with similar audiences such as the PR Department of Agriculture, Farm Service, Rural Development, NRCS, Commodity Farmers' Association, The Family Department, the Head Start Program and the Departments of Education and others. Particularly, PRAES joint efforts with the Agricultural Experimental Station where Extension agents and researchers worked together in the organization of commodity meetings in which critical issues were discussed with farmers and other audiences related to agriculture. Periodic progress evaluations are conducted to assess how programs are accomplishing their objectives and impacts.

4-H State Team offered support and mentoring to county agents, adults and youth volunteers. New external funding resources were identified; alliances were created with several state agencies to support our program. We support 4-H college students to become mentors in our 4-H State program. 4Hers participated in mass communication to promote 4-H as a positive organization for youth.

Youth Voice: Youth Choice strategy was reinforced, preparing our participants (Youth Leaders) in different subject matter areas and providing them with the opportunity to design and to deliver information about 4-H initiatives using a variety of strategies in schools and communities.

PRAES-CRD was able to draw interest and train a growing number of community members in business design and planning. Participants strived to put in practice the skills and knowledge gained through the "Community Entrepreneurship Toolbox." Despite the widening economic crisis, some participants managed to initiate their small businesses and community enterprises.

**Total Actual Amount of professional FTEs/SYs for this State**

Year: 2015	Extension		Research	
	1862	1890	1862	1890
Plan	157.9	{No Data Entered}	52.0	{No Data Entered}
Actual	167.4	0.0	55.5	0.0

**II. Merit Review Process**

**1. The Merit Review Process that was Employed for this year**

- Internal University Panel
- External University Panel
- External Non-University Panel
- Expert Peer Review

**2. Brief Explanation**

2. Brief Explanation

The Merit Review process for Extension continues to be conducted through four committees which represent our four major program areas: Agriculture, Marketing and Natural Resources; Family and Consumer Science; 4-H and Youth Development and Community Resource Development. Each committee is composed of External University and External Non-University Personnel. They met twice during the year. In the first meeting, Extension staff presented the Preliminary Plan of Work for the upcoming year and members of the committee were asked to present their recommendations related to the POW. The program area leaders, together with other Extension staff, defined the educational strategies to address the recommendations offered by the committee members. These were then incorporated in the final POW as needed. During the second committee meeting an oral and written report were presented by the program area leader which identify how the committee recommendations were addressed and the Annual Report of Accomplishment was presented to the committee.

In the case of the PRAEXS there was no significant change in our merit review process since our last year POW update and Annual Report was submitted. We continued to allocate part of our Hatch-funded research to competitive project grants selected on the basis of an annual call for proposals with the year's

revised priorities. More specifically, the scientific peer review process of Hatch proposals was the following:

A call for proposals including the year's revised research priorities was prepared and distributed by the PRAEXS Research Office. Proposals were submitted to the Assistant Dean for Research with the preliminary endorsement of the respective Department Head. The Assistant Dean for Research sent the proposals to a local peer reviewer and to an external reviewer for their written comments on the scientific merit of the proposed research and compliance with the PRAEXS strategic plan. Proposals and their reviewers' input were discussed and evaluated by the CAS Associate and Assistant Deans for Research, and a final decision was taken by the administration. Project directors of the selected proposals were given the opportunity to incorporate reviewers' suggestions and make adjustments as appropriate. These proposals were then sent to NIFA through the REEport system for review by the corresponding national program leader. Once the proposals were approved in Washington, the new or revised projects were included in the PRAEXS research program.

### III. Stakeholder Input

#### 1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals

#### Brief explanation.

1. Actions taken by PRAES to seek stakeholder input that encouraged their participation
  - Targeted invitation to traditional stakeholder individuals and collaborators

#### Brief explanation.

At the municipal level, the Local Advisory Committees main task is to collect input from our local stakeholders. The committees are composed of at least two participants from each of the program areas (Agriculture, Marketing and Natural Resources; Family and Consumer Sciences; 4-H and Youth Development and the Community Resource Development) and a minimum of two representatives from local agencies that work with similar Extension audiences. To encourage their participation, potential members received an invitation letter explaining the importance of the process and their participation to contribute improving Extension educational programs and general well-being of the people.

2. Brief explanation of Actions taken by PRAEXS to seek stakeholder input that encouraged their participation

First, the PRAEXS continues to celebrate an annual meeting with researchers, extension faculty, farmers and other members of the public interested in the work performed by the different programs or commodity groups. In these meetings the progress of active research projects is discussed, preliminary results are shared and further input is sought from participants to update research needs and priorities. The meeting is usually celebrated in the Research Center or Substation closest to the principal area of production, and coordinated with the Agricultural Extension Service commodity specialist and agricultural agents of the region. Both the commodity leader and other extension personnel identify and invite members of producers associations, individual farmers, faculty and



students, government officials, and community organizations with an interest in the commodity's work and related research programs. The Associate Dean or the commodity leader send personal invitations to relevant government officials and positional leaders of stakeholders groups. These meetings are also announced in the PRAEXS web page and frequently printed in the local agricultural monthly newspaper. The input received in these meetings from all the stakeholders present is summarized, evaluated and presented in a meeting of commodity group leaders, program coordinators and research administrators, where final decisions are made concerning research priorities. The list of priorities assembled through this process guides the year's call for proposals for new Hatch and Special projects.

Second, commodity group leaders, program coordinators and directors of integrated academic departments have organized thematic workshops, seminars, and field days where research results have been shared and alternative views on the subject--including further research and extension needs, or public policy determinations-- have been discussed. The feedback received in these activities continues to inform the current process of program assessment for our rolling five-year POW.

**2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them**

**1. Method to identify individuals and groups**

- Use Advisory Committees
- Open Listening Sessions
- Other ((consultations with local extension agents and commodity leaders))

**Brief explanation.**

1. PRAES Method to identify individuals and groups

- Use Advisory Committees

Brief explanation.

The members of these committees were selected by the Extension personnel at the local office from among their target audience, based on their experience and participation in the Extension programs, invited by letter and follow-up visits to join the committee.

2. PRAEXS methods to identify individuals and groups

- Use Advisory Committees
- Other (consultations with local extension agents and commodity leaders)

Brief explanation:

Stakeholders were identified through commodity leaders, project directors knowledgeable of their targeted audience, extension agents, and through local advisory committees established by CAS administrators. Stakeholders are asked about the most critical issues affecting their commodities and localities and about our research priorities. This information is summarized in a report made by the commodity and program leaders.

**2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them**

**1. Methods for collecting Stakeholder Input**

- Meeting with traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Meeting specifically with non-traditional individuals
- Other (Focus group)

**Brief explanation.**

1. PRAES Methods for collecting Stakeholder Input

- Meeting with traditional Stakeholder individuals

Brief explanation.

The process to collect the stakeholder input took place through meetings. The committee met twice during the year to discuss critical issues locally, as well as to identify emerging issues that could be addressed by Extension. Each local committee identified priority issues in each of the four program areas.

2. PRAEXS methods

- Meeting with traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Meeting specifically with non-traditional individuals

Brief Explanation:

Input from stakeholders is collected at the meetings convened by commodity and program leaders, and in activities with non-traditional groups such as organic farmers. At the end of the meeting stakeholders are asked to fill a written evaluation that includes questions about the most critical issues affecting their commodities, localities, or production systems, and about our research priorities. This information is summarized in a report made by the commodity, program leader, or administrator convening the meeting.

**3. A statement of how the input will be considered**

- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

**Brief explanation.**

PRAES Brief explanation.

Input collected from stakeholders at the Local Advisory Committees was reported to the state

level. This data was evaluated by state program leaders in order to identify emerging issues that ought to be included in the state plan of work or redirect programs when needed. Issue identified by farmers and other agricultural representatives that required or suggested a research agenda, are referred to the Agricultural Experiment Station. At the local level, municipalities set priorities for the local plan of work according to their stakeholder's input.

PRAEXS brief explanation:

Stakeholders input has been used in the determination of the research priorities of each planned program and commodity group, and these in turn, have guided the request for proposals released by the PRAEXS Research Office during the year. The inputs received during past years from traditional and non-traditional stakeholders and from government officials were also critical for starting a pilot organic experimental farm and for investing in the remodeling of research infrastructure into a Certified Quarantine Facility to better meet the threats presented by invasive species.

### **Brief Explanation of what you learned from your Stakeholders**

PRAES

Most of the input received from our stakeholders relates to the needs and situations affecting individuals, communities and our society in general. Most of the issues identified for FY 2015 are those from FY 2014. As people continues to gain awareness about Food Security through our Planned Programs, there has been an increased interest in vegetable gardening, both at the household level and at the community level school garden.

Another issue identified by our stakeholders is obesity, particularly among children and youth. Stakeholders coincide that contributing factors are mainly bad food choices and lack of physical activity. Extension has been addressing these issues through two of the National Initiative; Childhood Obesity and Food Security. The situation persist and is widespread through the population. Therefore, we will continue to work on these issues in our Planned Programs for the upcoming years. People are also concerned about extreme weather events and it 's effect in local food production, mainly drought. There has been an increase in requests on water harvesting and storage for both: home and farming.

Among Agricultural issues, our stakeholders coincide in the importance of creating awareness about food security at our state level. They have also mentioned the importance of promoting sustainable agricultural practices, protecting our agricultural lands and natural resources, developing efficient marketing strategies as well as issues related to agricultural financing. All are issues that Extension addresses through our Agricultural related Planned Programs but that needs to provide continue update and still are ranked as priorities.

Issues affecting children, youth and families, in addition to obesity, stakeholders are mainly concerned with the domestic violence affecting our women, children and the elderly. This continues to strengthen the importance of our state level Family Well-being Planned Program which emphasize in parenting skill and social and personal values through our educational curriculum directed at adults, youth and the elderly. Stakeholders also recognized the contribution of Extension addressing these and other issues affecting our youth, through our 4-H clubs organized in schools and communities.

At the community level, some stakeholders still confuse our educational programs with the services provided by other governmental agencies as they mainly present infrastructural needs, which Extension personnel redirect to the concerning agencies. Extension educational program on community development emphasized the importance of increasing leadership skills among their members, entrepreneurship and self-reliance. Most stakeholders also coincide in the importance of continue developing community - based businesses as a strategy to alternate the economic crisis affecting our population.

**PRAEXS**

The most important continuing concerns of stakeholders participating in commodity meetings and program evaluations are: (1) the lack of quality seed availability in the island and its relationship with local food security; (2) the need of alternative management strategies for the control of new pests and diseases; and (3) the need to find economical alternatives to expensive production inputs driving up local production costs--energy, fertilizers, and labor in particular. In response to these concerns PRAEXS has been expanding the production and distribution of improved cultivars developed over the years in our substations around the island; have increased crop protection studies and research activities related to the detection and management of damaging pests and diseases; have upgraded research infrastructure facilities such as the Center of Excellence in Quarantine and Invasive Species; and continues to adapt its programs' outlook towards the search for economical management practices. In our Animal Systems program, for example, crop rotations including annual legume green manures are being evaluated for the production of high quality forages, in an effort to control costly synthetic fertilizers applications. In other programs, studies are in progress on other alternative fertilization methods which can potentially increase output while controlling costs, and in the evaluation of sustainable energy alternatives with the potential of reducing energy costs. Stakeholders have also provided recommendations on how to improve the ways in which we traditionally share information with them. In response to these latter suggestions researchers are using other alternative methods, such as podcasts and web pages, to extend results to a wider audience.

**IV. Expenditure Summary**

<b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b>			
<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
6557021	0	4605505	0

<b>2. Totaled Actual dollars from Planned Programs Inputs</b>				
	<b>Extension</b>		<b>Research</b>	
	<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
<b>Actual Formula</b>	8693010	0	4447209	0
<b>Actual Matching</b>	4171773	0	2645755	0
<b>Actual All Other</b>	0	0	66214	0
<b>Total Actual Expended</b>	12864783	0	7159178	0

<b>3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous</b>				
<b>Carryover</b>	0	0	761675	0

**V. Planned Program Table of Content**

S. No.	PROGRAM NAME
1	Global Food Security - Plant Production Systems, Genetic Resources and Breeding Program
2	Animal Systems
3	Integrated Management of New and Emerging Pests and Diseases
4	Climate Change, Natural Resources and Environment
5	Food Safety, Science and Technology
6	Community Resources for Sustainable Development, Agricultural Economics, Marketing and
7	Sustainable Energy
8	Adult and Childhood Obesity
9	Family Well-being
10	Strengthening Youth Life Skills, Leadership and their Community
11	Global Food Security and Hunger

**V(A). Planned Program (Summary)**

**Program # 1**

**1. Name of the Planned Program**

Global Food Security - Plant Production Systems, Genetic Resources and Breeding Program

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
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		7%	
202	Plant Genetic Resources	5%		30%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		7%	
204	Plant Product Quality and Utility (Preharvest)	20%		7%	
205	Plant Management Systems	20%		21%	
403	Waste Disposal, Recycling, and Reuse	10%		0%	
405	Drainage and Irrigation Systems and Facilities	10%		21%	
601	Economics of Agricultural Production and Farm Management	15%		7%	
602	Business Management, Finance, and Taxation	10%		0%	
604	Marketing and Distribution Practices	10%		0%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	19.6	0.0	12.2	0.0
<b>Actual Paid</b>	25.8	0.0	8.8	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.9	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
1396668	0	1011571	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
698334	0	688328	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	14561	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

- Technical production training meetings.
- Capacity building workshops
- Demonstration of methods
- Meetings, visits and guidance to farmers
- Collaboration with state, local and federal government agencies.
- Use of mass media to disseminate information.
- Preparation of technical plans (IPM, irrigation systems, cultivation practices)
- Prepare curricula and other educational materials.
- Acquired, evaluated, conserved and distributed plant germplasm
- Developed and released sweet chili peppers lines, cultivars and germplasm
- Improved bean yield potential; helped to identify and implement sustainable agricultural systems
- Developed a program for supplying high quality "USDA Organic" seeds to local farmers
- Introduced and evaluated orange-fleshed sweet potato clones
- Conducted survey of nutrient status in soil and plant tissue in farm fields for arracacha
- Developed in-vitro propagation protocols; conducted fertilization and irrigation studies for achachairu for the vegetative growth of trees
- Presented research results in local, national, regional and international scientific meetings
- Published research results in local newspapers, bulletins, proceeding and referred journals
- Celebrated joint field days, seminars and commodity meetings with PRAEXS and PRDA
- Continued with the identification of critical issues from stakeholders, especially through commodity meetings
- Published technological packages of crop production systems for cabbage and other vegetable crops

**2. Brief description of the target audience**

Farmers, government professionals, county agents, agricultural entrepreneurs, pesticide applicators, homeowners, landscapers, and professionals from the private sector.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	13739	17936	629	860

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

**Patent Applications Submitted**

Year: 2015

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	1	4	5

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of producers trained in integrated coffee management.

Year	Actual
2015	380

**Output #2**

**Output Measure**

- Number of producers trained in integrated banana and plantain management

Year	Actual
2015	981

**Output #3**

**Output Measure**

- Number of producers trained in integrated starchy crops management.



<b>Year</b>	<b>Actual</b>
2015	300

**Output #4**

**Output Measure**

- Number of producers trained in integrated vegetable management.

<b>Year</b>	<b>Actual</b>
2015	1259

**Output #5**

**Output Measure**

- Number of producers trained in integrated tropical fruits management.

<b>Year</b>	<b>Actual</b>
2015	369

**Output #6**

**Output Measure**

- Number of producers trained in integrated citrus management.

<b>Year</b>	<b>Actual</b>
2015	209

**Output #7**

**Output Measure**

- Number of persons trained in vegetable gardening.

<b>Year</b>	<b>Actual</b>
2015	6465

**Output #8**

**Output Measure**

- Number of collaborations established to improve outreach.

<b>Year</b>	<b>Actual</b>
2015	99

**Output #9**

**Output Measure**

- Number of educational activities offered (e.g. meetings, demonstrations, field days, press releases, workshops).

<b>Year</b>	<b>Actual</b>
2015	6

**Output #10**

**Output Measure**

- Records of the number and type of germplasm accessions distributed to scientists and the public.  
Not reporting on this Output for this Annual Report

**Output #11**

**Output Measure**

- Number of participants in field days.

<b>Year</b>	<b>Actual</b>
2015	50

**Output #12**

**Output Measure**

- Number of participants in on-farm demonstrations.  
Not reporting on this Output for this Annual Report

**Output #13**

**Output Measure**

- Number of students attending field days to seed production fields, germplasm collections and other experimental fields.  
Not reporting on this Output for this Annual Report

**Output #14**

**Output Measure**

- Number of refereed publications.

<b>Year</b>	<b>Actual</b>
2015	9

**Output #15**

**Output Measure**

- Number of non-refereed publications.

<b>Year</b>	<b>Actual</b>
2015	29

**Output #16**

**Output Measure**

- Number of presentations in scientific meetings.

<b>Year</b>	<b>Actual</b>
2015	29

**Output #17**

**Output Measure**

- Number of research and/or extension proposals submitted addressing Global Food security and hunger.

<b>Year</b>	<b>Actual</b>
2015	23

**Output #18**

**Output Measure**

- Number of MS Thesis related to Global Food security and hunger.

<b>Year</b>	<b>Actual</b>
2015	7

**Output #19**

**Output Measure**

- Number of new/improved varieties developed and released.

<b>Year</b>	<b>Actual</b>
2015	4

**Output #20**

**Output Measure**

- Number of activities to inform stakeholders about established projects and their benefits

<b>Year</b>	<b>Actual</b>
2015	6

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of farmers that adopted two or more recommended practices for integrated coffee management.
2	Number of producers that increased production and quality of coffee.
3	Number of producers that adopted two or more recommended practices for integrated plantain and banana management.
4	Number of producers that increased production in plantain.
5	Number of producers that adopted two or more recommended practices for vegetable management.
6	Number of producers that increased production in vegetable crops.
7	Number of producers that adopted two or more recommended practices for citrus management.
8	Number of producers that increased production in citrus.
9	Number of producers that acquired knowledge after completing a course in vegetable gardening.
10	Number of persons that established a vegetable garden after completing a course in vegetable gardening.
11	Number of stakeholders that adopted the proposed Best Management Practices.
12	Records of the sales of seed of improved cultivars at the Substations.
13	Number of locally produced starchy crops with increased output according to the Department of Agriculture Statistics.
14	Number of vegetable crops with increased output according to Dept. of Agriculture statistics.
15	Number of stakeholders gaining knowledge on organic agricultural practices and acquiring certified organic seeds.

**Outcome #1**

**1. Outcome Measures**

Number of farmers that adopted two or more recommended practices for integrated coffee management.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	231

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
205	Plant Management Systems

**Outcome #2**

**1. Outcome Measures**

Number of producers that increased production and quality of coffee.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	85

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

**Outcome #3**

**1. Outcome Measures**

Number of producers that adopted two or more recommended practices for integrated plantain and banana management.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	478

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
205	Plant Management Systems

**Outcome #4**

**1. Outcome Measures**

Number of producers that increased production in plantain.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	217

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

**Outcome #5**

**1. Outcome Measures**

Number of producers that adopted two or more recommended practices for vegetable management.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1064

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
205	Plant Management Systems

**Outcome #6**

**1. Outcome Measures**

Number of producers that increased production in vegetable crops.

**2. Associated Institution Types**

- 1862 Extension



**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	520

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

**Outcome #7**

**1. Outcome Measures**

Number of producers that adopted two or more recommended practices for citrus management.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	100

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Citrus producers in Puerto Rico face problems associated to Citrus Greening disease. The presence of this destructive disease required the intervention of Extension agents and specialists

to deliver an educational program to producers on integrated management of the disease to improve production.

**What has been done**

Field days and trainings to demonstrate Citrus Greening integrated management practices were used as educational tools to show farmers how the application of a fertilization program and insects control with the alternate use of insecticides will help them to control the disease in their farms and increase production. Extension specialists and agents offered trainings, visits and orientations to farmers, including the distribution of educational materials.

**Results**

Forty eight percent (48%) of the growers that were trained in Citrus Greening (CG) management adopted a scheduled fertilization and insecticide application program in their farms. The main outcome of the CG educational program was an increase in the growers understanding of the disease, and the use of a sustainable management program that includes fertilization and application of insecticides. The educational activities included trainings and field days.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
205	Plant Management Systems

**Outcome #8**

**1. Outcome Measures**

Number of producers that increased production in citrus.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	37

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

#### Outcome #9

##### 1. Outcome Measures

Number of producers that acquired knowledge after completing a course in vegetable gardening.

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2015	8680

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

In Puerto Rico we import 85% of the food we consume. One way to increase production at the local level is through home gardening. It is expected to increase vegetable production by establishing family gardens. Therefore, producing enough fresh vegetables to supply our demand and increase the consumption of vegetables. Furthermore, vegetables have a better taste when locally produced. They are a good source of vitamins. Besides, the physical effort in cultivating the garden contributes to physical and mental health.

###### **What has been done**

The vegetable gardening curricular guide, the Annual Festival of Vegetable Gardening, and the educational activities delivered by Extension Agents are effective in dissemination of vegetable gardening information to homeowners and other public. 187 courses were given in vegetable gardening, and 6,465 persons around the Island completed a short course.

###### **Results**

Two hundred and fifty five (255) of the 6,465 persons around the Island that completed a short course established a vegetable garden. Eight hundred and forty four (844) families increased their food supply by establishing vegetable gardens. Twenty (20) families in the municipality of San Sebastian obtained benefit of the educational effort in vegetable gardening and now produced spinach, lettuce and pumpkin at commercial level. The same persons experimented with the production of compost and vermicompost. A family established a vermicomposting business using

5 gallons buckets and using the lixiviate as fertilizer for the vegetable production. 4-H clubs from Salinas and Guayama municipalities prepared two community vegetable gardens that are going to be used as demonstrative vegetable gardens to motivate other communities in these municipalities.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

**Outcome #10**

**1. Outcome Measures**

Number of persons that established a vegetable garden after completing a course in vegetable gardening.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	2179

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

## **Outcome #11**

### **1. Outcome Measures**

Number of stakeholders that adopted the proposed Best Management Practices.

### **2. Associated Institution Types**

- 1862 Research

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Farmers in Puerto Rico need to sustainably increase yields and reduce production costs in order to compete in an open market economy.

#### **What has been done**

Printed copies of technological practices for different crops are distributed to farmers, extension agents, and specialists, PR and Federal Government officials, educators, private sector professionals in agriculture and the public. A technological package for watermelon was published in 2015, and drafts for melons (honeydew and cantaloupe) and taniers are in an advanced stage of completion. BMP are presented and discussed at field days and workshops by PRAEXS and the Extension Service.

#### **Results**

The PRAEXS distributed 7,415 paper copies of technological packages, Journals of Agriculture of the UPR and other bulletins and publications in 2015. Internet blogs by researchers received over 2.5 million hits in the internet. PRAEXS provides vital support for the continued production of traditional crops because seed is not available from the private sector. Most of the starchy vegetables are propagated by vegetative planting material.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
202	Plant Genetic Resources
205	Plant Management Systems

**Outcome #12**

**1. Outcome Measures**

Records of the sales of seed of improved cultivars at the Substations.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Lack of seeds of improved germplasm continues to be one of the major constraints to production identified by extension agents and growers in our yearly commodity meetings with stakeholders.

**What has been done**

The PR Department of Agriculture contracted the PRAEXS to produce seeds, vegetative planting materials, seedlings and grafted fruit trees for distribution to growers. At the Fortuna Substation, 7,669 grafted trees of avocados, 714 of mango, 505 of soursop, and 237 of West Indian cherry were distributed, as well as 98 passion fruit and grape seedlings. Other fruit trees included guava, lime, cashew, papaya and tamarind. At the Corozal and Gurabo Substations, plantain, banana, and root & tuber crop planting materials were distributed. At the Isabela Substation, 9,407 of tanager planting materials were distributed to growers.

**Results**

The land area planted with improved varieties has been increasing over the past few years. The Isabela Substation sold 6,828 pounds of beans, 1,384 pounds of corn, 94 pounds of tropical squash, 276 pounds of pigeon peas, and 122 pounds of coriander to growers in 2015. At the Adjuntas Substation, 34,500 seedlings and 8,585 pounds of coffee seeds and 2,635 citrus seedlings were sold.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
202	Plant Genetic Resources
205	Plant Management Systems

### **Outcome #13**

#### **1. Outcome Measures**

Number of locally produced starchy crops with increased output according to the Department of Agriculture Statistics.

#### **2. Associated Institution Types**

- 1862 Research

#### **3a. Outcome Type:**

Change in Action Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

Production of root & tuber crops has decreased by more than 80% during the past 60 years, while consumption has decreased by a much lower percent.

##### **What has been done**

PRAEXS has an active research program in starchy crops. New varieties have been developed locally or introduced and evaluated.

##### **Results**

Improved management practices have resulted in improved yields. Research results together with outreach by the extension specialist and agents have resulted in increased production by farmers participating in commodity meetings. PR Department of Agriculture statistics are not yet available for the 2014/15 year.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

**Outcome #14**

**1. Outcome Measures**

Number of vegetable crops with increased output according to Dept. of Agriculture statistics.

Not Reporting on this Outcome Measure

**Outcome #15**

**1. Outcome Measures**

Number of stakeholders gaining knowledge on organic agricultural practices and acquiring certified organic seeds.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	0

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

A demand exists for organically grown crops. Current local supply of organically grown crops is very limited. Organic seeds must be imported at high costs from suppliers in temperate zones. Organic seeds of crops that grow in tropical conditions are necessary to meet local demand. Very small area of PR has been designated as organic farms.

**What has been done**

Areas within the Gurabo and Lajas Substation of the PRAEXS have been certified as organic. The PRAEXS has been distributing seeds with the USDA Organic label since receiving the final organic certificate from the Quality Certification Services (Gainesville, Florida) in 2010.

**Results**

At the organic farm at the Lajas Substation of PRAEXS 2,044 pounds of organic seed of 63 different vegetables, culinary herbs and cover crops have been distributed with the USDA Organic label. Organic seeds are advertised at the project website at [http://prorganico.info/organico\\_semillas.htm](http://prorganico.info/organico_semillas.htm). Over 4,205 packages have been distributed. Seeds of the following crops have been produced: tropical pumpkin, eggplant, okra, upland rice, corn, cilantro, winged beans, cowpea, Mucuna, Crotalaria, basil, corn and others.



#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
205	Plant Management Systems

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes

##### Brief Explanation

Citrus production was significantly affected as a result of the severity of the Citrus Greening Disease. Increasing costs in the application of insecticides to manage the psilid vector and the use of an intensive fertilization program is a factor that limits growers economically. The Extension Service is working in close collaboration with researchers and pesticide dealers to educate growers to overcome the disease.

#### V(I). Planned Program (Evaluation Studies)

##### Evaluation Results

No evaluation was conducted during 2015.

##### Key Items of Evaluation

N/A

**V(A). Planned Program (Summary)****Program # 2****1. Name of the Planned Program**

Animal Systems

 Reporting on this Program**V(B). Program Knowledge Area(s)**

## 1. Program Knowledge Areas and Percentage

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
102	Soil, Plant, Water, Nutrient Relationships	8%		0%	
132	Weather and Climate	5%		0%	
133	Pollution Prevention and Mitigation	5%		0%	
202	Plant Genetic Resources	5%		5%	
204	Plant Product Quality and Utility (Preharvest)	0%		10%	
205	Plant Management Systems	8%		10%	
301	Reproductive Performance of Animals	8%		5%	
302	Nutrient Utilization in Animals	8%		10%	
303	Genetic Improvement of Animals	8%		13%	
305	Animal Physiological Processes	0%		10%	
306	Environmental Stress in Animals	8%		12%	
307	Animal Management Systems	0%		10%	
308	Improved Animal Products (Before Harvest)	5%		5%	
311	Animal Diseases	5%		5%	
313	Internal Parasites in Animals	5%		0%	
315	Animal Welfare/Well-Being and Protection	5%		5%	
401	Structures, Facilities, and General Purpose Farm Supplies	5%		0%	
403	Waste Disposal, Recycling, and Reuse	5%		0%	
601	Economics of Agricultural Production and Farm Management	5%		0%	
602	Business Management, Finance, and Taxation	2%		0%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)****1. Actual amount of FTE/SYs expended this Program**

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	12.6	0.0	6.1	0.0
<b>Actual Paid</b>	12.6	0.0	3.3	0.0
<b>Actual Volunteer</b>	0.0	0.0	1.6	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
681011	0	1536017	0
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
340506	0	741844	0
<b>1862 All Other</b>	<b>1890 All Other</b>	<b>1862 All Other</b>	<b>1890 All Other</b>
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

1. Conducted seminars, meetings, trainings, extension agent certifications, and workshops.
2. Made local and international visits (with similar environments and agricultural systems) to exchange farm management practice experiences and research findings.
3. Produced educational material (publications, newsletters, CDs).
4. Developed proposals to find external resources in order to conduct applied research to address the current needs in livestock production.
5. Offered counseling and orientation.
6. Worked in collaboration with communications media.
7. Collaborated with government agencies (e.g., Environmental Quality Board; State Departments of Health, Agriculture, Environmental and Natural Resources, and Education; Puerto Rico Aqueducts and Sewage Authority; USEPA; USDA; NRCS; and others).
8. Improved collaboration with our partners at the University of Puerto Rico and other educational institutions.
9. Developed educational material consisting of model plans and educational material (publications, newsletters, CDs).
10. Managed the dairy herd at the Lajas PRAEXS. Performed silage evaluations of several sorghum varieties, and trials for an evaluation of the level and type of concentrate supplementation of dairy cows fed with tropical forages.
11. Produced seeds of two lines of soybean for planting at farmers' fields as means of transferring the technology for high quality hay production.
12. Continued research focused in providing genetic improvements towards heat tolerance in bovine cattle. Salient accomplishments from projects include: (1) Identification of SLICK homozygous and heterozygous Holsteins and Senepol; (2) Collection of considerable amount of body temperature data in order to compare slick vs. normal haired Puerto Rican dairy cows; (3) Demonstration that the hair length of pure Holstein cattle from the PRAEXS dairy farm had an inverse correlation to the expected productive life

of cows, and that hair width had a positive correlation to expected milk production, but an inverse correlation to somatic cells counts.

13. Produced 11 peer-reviewed publications and three non-refereed serial publications that report research results and other pertinent information to benefit producers and other interested parties.

**2. Brief description of the target audience**

Farmers, agricultural entrepreneurs, animal rights organizations, schools, PRAES professionals, government personnel, community leaders, and professionals from the private sector.

**3. How was eXtension used?**

www.eXtension.org has been used as a source of information by Extension Specialists and Agents to complement training presentations, material offered to Extension Agents and Farmers, as well as professional development material.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	425	150	35	10

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

**Patent Applications Submitted**

Year: 2015

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
Actual	1	10	11

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- 1. Number of farmers trained in recommended bio-security practices as a means to mitigate diseases and increase animal production.

<b>Year</b>	<b>Actual</b>
2015	527

**Output #2**

**Output Measure**

- 2. Number of farmers trained in practices in animal welfare and protection.

<b>Year</b>	<b>Actual</b>
2015	582

**Output #3**

**Output Measure**

- 3. Number of farmers trained in recommended practices in recordkeeping, disease control and prevention, and feed utilization.

<b>Year</b>	<b>Actual</b>
2015	450

**Output #4**

**Output Measure**

- 4. Number of dairy-beef farmers trained in recommended practices that are efficient against internal parasites in Puerto Rico.

<b>Year</b>	<b>Actual</b>
2015	138

**Output #5**

**Output Measure**

- 5. Number of farmers trained in the effects of climate change on livestock production.

<b>Year</b>	<b>Actual</b>
2015	154

**Output #6**

**Output Measure**

- 6. Number of farmers trained in the implementation of alternative crops/forages as a means to improve nutrient utilization in livestock production.

<b>Year</b>	<b>Actual</b>
2015	279

**Output #7**

**Output Measure**

- 7. Number of farmers trained in recommended economic practices associated with efficiency in livestock production.

<b>Year</b>	<b>Actual</b>
2015	275

**Output #8**

**Output Measure**

- 8. Number of meetings held with stakeholders to discuss the situation of each relevant industry and corresponding research priorities.

<b>Year</b>	<b>Actual</b>
2015	5

**Output #9**

**Output Measure**

- 9. Number of popular (non-refereed) publications to report research results and other pertinent information for the benefit of producers and other interested parties.

<b>Year</b>	<b>Actual</b>
2015	4

**Output #10**

**Output Measure**

- 11. Number of publications in refereed scientific journals.

<b>Year</b>	<b>Actual</b>
2015	11

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	1. Number of farmers that adopted a bio-security program.
2	2. Number of farmers that adopted practices in animal welfare and protection.
3	3. Number of farmers that increased animal production after adopting the recommended recordkeeping, disease control and prevention, and feed utilization practices.
4	4. Number of farmers that adopted practices for the control of parasites on their farms.
5	5. Number of farmers that adopted one or more practices to control heat stress.
6	6. Number of persons that improved the nutrient utilization practices in animals.
7	7. Number of farmers and agricultural entrepreneurs that used economic tools to make effective economic decisions to improve their business.
8	8. Number of producers participating in field days or training sessions who express willingness to adopt recommended management practices on their farms
9	9. Quantitative description of breeding stock of purebred Senepol and crossbreds of Senepol with other beef breeds from the University of Puerto Rico herd, sold to local beef producers to improve the genetic quality of their herds

### **Outcome #1**

#### **1. Outcome Measures**

1. Number of farmers that adopted a bio-security program.

#### **2. Associated Institution Types**

- 1862 Extension

#### **3a. Outcome Type:**

Change in Action Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	144

#### **3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
311	Animal Diseases
313	Internal Parasites in Animals
315	Animal Welfare/Well-Being and Protection

### **Outcome #2**

#### **1. Outcome Measures**

2. Number of farmers that adopted practices in animal welfare and protection.

#### **2. Associated Institution Types**



- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	81

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
311	Animal Diseases
313	Internal Parasites in Animals
315	Animal Welfare/Well-Being and Protection
401	Structures, Facilities, and General Purpose Farm Supplies

**Outcome #3**

**1. Outcome Measures**

3. Number of farmers that increased animal production after adopting the recommended recordkeeping, disease control and prevention, and feed utilization practices.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	102

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Upon the death of Lolita Dairy Farms owner, the family solicited technical services to the local Cabo Rojo Extension Agent. This to improve the general condition of the farm, given that since 2010 to 2011 the dairy was running with a deficit of \$8,000 monthly.

**What has been done**

Coordination with the Ruminant Nutrition Extension Specialist was done to train the farm personnel about nutritional practices to maximize milk production and cow health, and pasture management. The local extension agent provided additional training about milking routine, systems to provide adequate water intake, reproduction and heifer breeding programs, soil and pasture recovery and rotations among other management to improve efficiency. The local agricultural agent monitored progress with routine farm visits.

**Results**

The dairy incorporated records of the operation (e.g., reproduction, animal ID) and registered the farm in the DHI Program. Substantial improvements in the milking routine were accomplished to the extent that in 2013 Lolita Dairy Farm obtained the Dairy Industry Regulatory Office Regional Milk Quality Award. In 2014, the dairy was able to generate enough money to cover the previous monthly losses (\$100 vs \$8,000, respectively). In 2014, the dairy was generating around \$5,000 annually after investing considerable resources in equipment and management practices to improve efficiency. It is expected that by the following years, the dairy begins to generate enough resources to become a profitable agricultural business. In 2011, the family was considering selling the dairy farm.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management

**Outcome #4**

**1. Outcome Measures**

4. Number of farmers that adopted practices for the control of parasites on their farms.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	31

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
303	Genetic Improvement of Animals
311	Animal Diseases
313	Internal Parasites in Animals
315	Animal Welfare/Well-Being and Protection

**Outcome #5**

**1. Outcome Measures**

5. Number of farmers that adopted one or more practices to control heat stress.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	30

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
303	Genetic Improvement of Animals
306	Environmental Stress in Animals
315	Animal Welfare/Well-Being and Protection
401	Structures, Facilities, and General Purpose Farm Supplies

**Outcome #6**

**1. Outcome Measures**

6. Number of persons that improved the nutrient utilization practices in animals.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	64

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
132	Weather and Climate
133	Pollution Prevention and Mitigation
202	Plant Genetic Resources
205	Plant Management Systems
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
401	Structures, Facilities, and General Purpose Farm Supplies
403	Waste Disposal, Recycling, and Reuse

**Outcome #7**

**1. Outcome Measures**

7. Number of farmers and agricultural entrepreneurs that used economic tools to make effective economic decisions to improve their business.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	111

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

## Results

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

#### Outcome #8

##### 1. Outcome Measures

8. Number of producers participating in field days or training sessions who express willingness to adopt recommended management practices on their farms

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2015	58

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

Beef producers need to improve their production efficiency and offer a high quality product to consumers in order to gain their favor in the market and increase the percentage of total consumption supplied by local beef.

###### **What has been done**

A series of workshops was offered to beef farmers on topics needed for securing an official Beef Quality Assurance Certification. This certification can help farmers add value to their meat by ensuring consumers that their animals are raised under production practices that are healthy, safe, humane, and efficient.

###### **Results**

Close to 90% of farmers participating in the workshops expressed willingness to adopt the recommended practices on their farms. The certification, provided to participants after passing an exam, could be instrumental for gaining access to preferred markets such as that of Grassfed Beef.

### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
205	Plant Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
306	Environmental Stress in Animals
308	Improved Animal Products (Before Harvest)
311	Animal Diseases
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management

### **Outcome #9**

#### **1. Outcome Measures**

9. Quantitative description of breeding stock of purebred Senepol and crossbreds of Senepol with other beef breeds from the University of Puerto Rico herd, sold to local beef producers to improve the genetic quality of their herds

#### **2. Associated Institution Types**

- 1862 Research

#### **3a. Outcome Type:**

Change in Action Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	18

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

Beef Cattle producers in Puerto Rico need to improve the genetic composition of their herds to increase their share of consumer markets, based on the high quality of their meat.

##### **What has been done**

The Montaña Beef Cattle Research and Teaching Farm is dedicated to improving animal science education and to conducting research that contributes to the development of Puerto Rico's beef cattle industry. Besides hosting graduate and undergraduate research in beef cattle genetics, physiology, nutrition, growth and beef quality, it provides UPR-CAS purebred registered Senepol cattle of high genetic merit to local cattlemen, and exports live cattle to the U.S. and islands of the Caribbean.

##### **Results**

Breeding stock sold to local producers in 2015:  
Beef cattle\* (18 animals)  
Purebred Senepol females: 2 cows and 5 heifers = 7 animals  
Purebred Senepol males: 8 bulls of various ages + 2 mature calves =10 animals  
Crossbred Senepol x Charolais male: 1 bull  
\*Item of related interest: Senepol breeding stock exported =18 animals  
Dairy cattle (3 animals)  
Grade Holstein females: 3 pregnant replacement heifers

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Government Regulations

##### Brief Explanation

In 2015, Puerto Rico experienced various external factors that affected outcome projections. For example, a drought from March to October of 2015 affected greatly the availability of forages in the cattle industry. The economic crisis, experienced these past years in our Island, could be attributed to the lower response in economic strategies adopted by all of our farmers. In addition, a recent regulation from the Dairy Industry Regulation Office, related to adjustments in the milk price, has negatively impacted the capability of dairy farmers implementing new technologies.

#### V(I). Planned Program (Evaluation Studies)

##### Evaluation Results

We are currently working together with the Dairy Herd Improvement Association to train our Extension Agents working with Dairy Farmers about creation of records using PC Dart. We expect to improve the quality and accuracy of the data collected in our online report system (SISE). In addition, together with personnel of the Experiment Station we are trying to increase efforts to improve the record keeping of other animal production systems.

The Beef Cattle Group celebrated a program activity at the PRAEXS-Gurabo in which farmers evaluated the information provided in the program's workshops and offered their views on the principal research priorities of their commodity. The twenty farmers who filled the form offered 28 recommendations. Of these, 28.6% mentioned the need for research in the area of pasture improvement and control of "yerba Venezolana" (*Paspalum fasciculatum*), 17.9% noted the importance of cost and profit margins studies for beef livestock operations, and 7% mentioned more research is needed on zoonotic diseases and animal health.

##### Key Items of Evaluation



Research priorities emerging from the beef cattle producers program evaluation are (1) pasture improvement and control of "yerba Venezolana" (*Paspalum fasciculatum*), (2) cost and profit margins studies for beef operations, and (3) zoonotic diseases and animal health.

**V(A). Planned Program (Summary)**

**Program # 3**

**1. Name of the Planned Program**

Integrated Management of New and Emerging Pests and Diseases

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
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		18%	
212	Pathogens and Nematodes Affecting Plants	20%		35%	
215	Biological Control of Pests Affecting Plants	0%		18%	
216	Integrated Pest Management Systems	80%		29%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	4.9	0.0	1.8	0.0
<b>Actual Paid</b>	4.2	0.0	2.8	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.7	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
228989	0	1270017	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
17644	0	832204	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	51653	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

The Integrated Management of New and Emerging Pest and Diseases activities reported in 2015 were accomplished; progress was significant in the combined activities planned with the Extension Service to disseminate the results in research and management of Citrus Greening. Citrus growers were knowledgeable of the advances in citrus greening research and management findings reported in Puerto Rico and elsewhere. Research and Extension personnel attended the Citrus, Plant Pathology and Entomological societies meetings, where research and extension results related to Citrus Greening and other important diseases were presented. The Citrus Program at the Experiment Station in Puerto Rico joined the Citrus Clean Plant Network (CCPN) strengthening the production of disease free citrus plants in Puerto Rico. A new Extension Vegetable Specialist was recruited and provided training and counseling in vegetable production. New investigations were initiated based on clientele and Extension Agent inputs to determine the effect of shade houses in management of key pests of cabbage, pepper and lettuce. The Plant Diagnostic Clinic has compiled information about the service provided through a survey to measure client satisfaction. Registration of safe and effective pesticides for management of pests in tropical fruits was finalized and the information disseminated in meetings and through a website.

Research in the use of alternative practices to control nematodes in Musa sp. continued. Results on alternative management practices for nematodes were disseminated in presentations at annual scientific meetings. Additionally, studies on controlling the Coffee Berry Borer with a parasitoid are promising. The program received feedback from stakeholders during commodity meetings, workshops, field days and farm visits. The input received is considered in establishing priorities to be addressed by our research and extension programs.

**2. Brief description of the target audience**

The target audience will include:

- Growers, agricultural businesses, commodity groups, industry leaders, and groups and individuals concerned with the effect of pests and diseases in food security, and its relationship with climate change.
- Faculty, graduate and undergraduate students, extension specialists, consultants and researchers.
- State and Federal Departments of Agriculture, USDA/ARS, USDA/NRCS, the USDA Forest Service and USDA/APHIS PPQ.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	250	0	500	0

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

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
Actual	2	5	7

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Output 1. Number of Faculty that design and provide classes, short trainings, conferences, talks, field days, workshops and training materials related to pests and diseases affecting food security.

Year	Actual
2015	7

**Output #2**

**Output Measure**

- Output 2. Number of Extension Specialists that provide training manuals, field days, talks, newspaper articles, conferences, and design web site resources in integrated pest management aiming at food security.

Year	Actual
2015	5

**Output #3**

**Output Measure**

- Output 3. Number of Faculty and Extension Specialists that provide information and recommendations on best management practices for pest and disease control.

Year	Actual
2015	4

**Output #4**

**Output Measure**

- Output 4. Number of abstracts and oral presentations in professional scientific meetings resulting from program activities.

<b>Year</b>	<b>Actual</b>
2015	17

**Output #5**

**Output Measure**

- Output 5. Number of joint Research-Extension activities that include pest diagnostics and identification.

<b>Year</b>	<b>Actual</b>
2015	4

**Output #6**

**Output Measure**

- Output 6. Number of field days, farm visits, symposia, workshops, topic conferences, and open houses that emphasized in IPM practices that impact food security.

<b>Year</b>	<b>Actual</b>
2015	7

**Output #7**

**Output Measure**

- Output 7. Number of individuals that visit the Web-based resources in IPM.

<b>Year</b>	<b>Actual</b>
2015	2000

**Output #8**

**Output Measure**

- Output 8. Number of peer reviewed articles published in major scientific journals resulting from program activities.

<b>Year</b>	<b>Actual</b>
2015	7

**Output #9**

**Output Measure**

- Output 9. Number of stakeholders with increased knowledge on emerging pests and aware of reduced risk pesticides.

<b>Year</b>	<b>Actual</b>
2015	361

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of farmers that adopted one or more recommended practices for Black Sigatoka Management.
2	Number of farmers that acquired knowledge in integrated management of Citrus Greening.
3	Number of farmers that adopted one or more recommended practices for integrated management of Citrus Greening.
4	Number of persons that acquired knowledge about IPM in the vegetable garden after completing a short course.
5	Number of persons that received diagnostic services and a report with integrated management recommendations after diagnosed for pest or diseases in crops.

**Outcome #1**

**1. Outcome Measures**

Number of farmers that adopted one or more recommended practices for Black Sigatoka Management.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	325

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

**Outcome #2**

**1. Outcome Measures**

Number of farmers that acquired knowledge in integrated management of Citrus Greening.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	94

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Citrus greening is the most important disease in citrus orchards in Puerto Rico. This destructive disease required the intervention of Extension specialists and Experiment Station researchers in delivering a field day as an educational tool to show growers and other personnel related to Citrus production about ongoing research and available management practices to face the management of the vector and the effects of the bacteria on citrus growth and development.

**What has been done**

The dissemination of results in research and management of Citrus Greening was accomplished through a field day and two Extension publications. Researchers and Extension Specialists attended the Citrus, Plant Pathology and Entomological societies meetings, where research and extension results related to Citrus Greening and other important diseases were presented. The Citrus Program at the Experiment Station in Puerto Rico joined the Citrus Clean Plant Network (CCPN) strengthening the production of disease free citrus plants in Puerto Rico. Extension agents offered 18 courses about integrated citrus management where Citrus greening management was included as part of the course.

**Results**

Citrus growers became knowledgeable of the advances in citrus greening research and management findings reported in Puerto Rico and elsewhere. Growers received educational information (newsletter, poster) about ongoing research and management.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems



**Outcome #3**

**1. Outcome Measures**

Number of farmers that adopted one or more recommended practices for integrated management of Citrus Greening.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	44

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Early detection capabilities for citrus greening and other graft-transmissible diseases are essential for citrus disease management.

**What has been done**

Citrus grown in orchards and in greenhouse structures are under inspection and yearly testing for graft-transmissible pathogens.

**Results**

Citrus growers with knowledge of the importance of the use of healthy citrus plants inspect their trees for presence of the Asian Citrus Psyllid. These growers also regularly test their citrus plants before planting or obtaining scions from mother trees. Rootstocks and Scions are tested for Citrus Tristeza Virus (CTV), Citrus Variegated Chlorosis and Citrus Greening (CG).

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

#### **Outcome #4**

##### **1. Outcome Measures**

Number of persons that acquired knowledge about IPM in the vegetable garden after completing a short course.

##### **2. Associated Institution Types**

- 1862 Extension

##### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

##### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	3961

##### **3c. Qualitative Outcome or Impact Statement**

###### **Issue (Who cares and Why)**

Extension personnel are increasing knowledge and practices for food production through vegetable gardening with the goal of promoting food security and improve pest management knowledge of homeowners and other people interested in vegetable gardening.

###### **What has been done**

Extension personnel train persons interested in vegetable gardening and IPM through a curricular guide. There are three lessons in the guide related to IPM: Integrated Management of Pests and Diseases, Benefits of companion crops and herbs in pest management and Biorational and natural pesticides.

###### **Results**

61% of the persons that completed a course in vegetable gardening acquired knowledge about IPM. More than a thousand (1,234) persons reduced the incidence of pests and diseases in vegetable gardens by using IPM.

##### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

**Outcome #5**

**1. Outcome Measures**

Number of persons that received diagnostic services and a report with integrated management recommendations after diagnosed for pest or diseases in crops.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	1121

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Pathogen and insect identification is essential in disease and pest management. In Puerto Rico there is a demand for fast and accurate diagnosis for disease and pest management decision making.

**What has been done**

The diagnostic capacity at the Plant Diagnostic Clinics (PDCs) has been enhanced, with routinely use of ELISA tests and Lateral Flow Devices (LFD) for specific viruses, bacterial, and fungal pathogens. The PDCs have expanded the use of specific lab tests such as PCR and other DNA-based methods for pathogen identification.

**Results**

A survey carried out in the Puerto Rico Plant Diagnostic Clinic PRPDC indicated that the growers and private companies are satisfied with the pest and disease diagnostic services provided.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

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

### **Brief Explanation**

The outcomes were mainly affected by the presence of extreme weather conditions. The introduction of Citrus Greening in 2009 threatened the Citrus industry in the Island and the effect of the disease on citrus crops was significant during 2015, as informed in the outcomes section. The activities developed depended of the continued programmatic and fiscal support of the USDA, the College of Agricultural Sciences, and the Department of Agriculture of Puerto Rico.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

No evaluation of the program was performed last year. This year an evaluation of the services provided by the Puerto Rico Plant Diagnostic Clinic is being carried out with a survey filled out by the clients of the PRPDC. Results relevant to the program will be provided next year.

### **Key Items of Evaluation**

**V(A). Planned Program (Summary)**

**Program # 4**

**1. Name of the Planned Program**

Climate Change, Natural Resources and Environment

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
101	Appraisal of Soil Resources	0%		8%	
102	Soil, Plant, Water, Nutrient Relationships	0%		14%	
103	Management of Saline and Sodic Soils and Salinity	0%		3%	
104	Protect Soil from Harmful Effects of Natural Elements	20%		7%	
111	Conservation and Efficient Use of Water	25%		17%	
112	Watershed Protection and Management	25%		5%	
121	Management of Range Resources	0%		3%	
122	Management and Control of Forest and Range Fires	0%		3%	
123	Management and Sustainability of Forest Resources	0%		4%	
125	Agroforestry	10%		0%	
132	Weather and Climate	20%		0%	
136	Conservation of Biological Diversity	0%		14%	
141	Air Resource Protection and Management	0%		2%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		12%	
212	Diseases and Nematodes Affecting Plants	0%		4%	
216	Integrated Pest Management Systems	0%		2%	
403	Waste Disposal, Recycling, and Reuse	0%		1%	
405	Drainage and Irrigation Systems and Facilities	0%		1%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890

<b>Plan</b>	8.6	0.0	3.7	0.0
<b>Actual Paid</b>	9.3	0.0	3.1	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.3	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
504533	0	527081	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
252267	0	314533	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 southern part of the Island is, on average, affected by 4,000 forest fires annually in a five month period (January through May). In 2015, the State Fire Department launched an aggressive educational campaign known as "Puerto Rico frente al fuego". Extension educational materials, as well as personnel, were an integral part of this campaign. A decrease in forest fires was reported in 2015, while an increase in the land area affected occurred, probably due to the drought.

This year, Puerto Rico was hard hit by a drought which severely affected farming. An intergovernmental committee was created to develop a strategic drought plan. The committee is composed by personnel from NRCS, NOAA, FS, Extension Service, USGA, EPA, and State Department of Natural Resources. Besides, we continue to collaborate with the Caribbean Area Climate Change Hub, as well as with FS to develop the Caribbean Cohesive Wildfire Management Action Plan. As a result of the collaboration with the Caribbean Climate Change Hub, a video was developed: Cattle & Dairy Farming in the Tropics - Climate Change Adaptation Demonstration Project [https://www.youtube.com/watch?v=\\_U1p3SlyWcA](https://www.youtube.com/watch?v=_U1p3SlyWcA)

The Agricultural Experiment Station, in collaboration with the Puerto Rico Environmental Quality Board (PREQB) and the USEPA Region 2, conducted studies leading to the determination of numeric nutrient reference criteria and numeric nutrient criteria for reservoirs in Puerto Rico. The PREQB recently modified the Water Quality Standards of Rivers and Streams of the island as related to nutrients. The levels adopted were: 0.160 mg/L for TP and 1.70 mg/L for TN. Consequently, the PREQB regulation was amended to include the new standard.

Outreach of research activities in this area has been varied and performed across disciplines, particularly in interdisciplinary groups. This activity has been documented through web videos, web seminars and podcasts. A special seminar series, "Coloquio AgroAmbiental", was developed to discuss major issues regarding natural resources and environment. For example, the number of visitors per page is as follows: Colloquium (8 videos, 55,083 hits); Recycling, Manure, and Sustainable Agriculture (1 million+); Irrigation Requirements in a Changing Climate (1017); other topics have registered 11,000; 19,000 and 65,000+.

Funding from research grants has been allocated to support student training, provide work experience and completion of master's degree in identified priority need areas within the agricultural and natural resources sciences. Students have been recruited to increase the number, quality and diversity in the Natural Resources and Agricultural Sciences in order to build up science competitiveness through actual research activities and experiences. Students recruited under the program have shown a tendency to pursue graduate studies in disciplines and topics related to the research program.

**2. Brief description of the target audience**

Farmers, communities, government professionals, county Extension personnel, Extension Specialists, faculty members, community leaders, youth, leaders, volunteers, students (undergraduate and graduates), consumers and community-based groups.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	748	910	529	2125

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

**Patent Applications Submitted**

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	0	6	6

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- 1. Number of people who received capacity development (workshops, seminars, conferences) on climate change.

<b>Year</b>	<b>Actual</b>
2015	786

**Output #2**

**Output Measure**

- 2. Number of people who received capacity development (workshops, seminars, conferences) on water quality, watershed protection, and maintenance.

<b>Year</b>	<b>Actual</b>
2015	391

**Output #3**

**Output Measure**

- 3. Number of people who received capacity development (workshops, seminars, conferences) on water collection, storage and re-use for agricultural purposes.

<b>Year</b>	<b>Actual</b>
2015	281

**Output #4**

**Output Measure**

- 4. Number of people who received capacity development in agroforestry, soil erosion, and storm water runoff control.

<b>Year</b>	<b>Actual</b>
2015	601

**Output #5**

**Output Measure**

- 5. Number of people who received capacity development on soil erosion and water environmental regulations.

<b>Year</b>	<b>Actual</b>
2015	214

**Output #6**

**Output Measure**

- 6. Number of persons who received capacity development on prevention of brush fire.



<b>Year</b>	<b>Actual</b>
2015	425

**Output #7**

**Output Measure**

- 7. Number of people who received capacity development on natural disasters and emergency management to reduce loses and maintain their farming operation.

<b>Year</b>	<b>Actual</b>
2015	249

**Output #8**

**Output Measure**

- 8. Number of collaborations established.

<b>Year</b>	<b>Actual</b>
2015	37

**Output #9**

**Output Measure**

- 9. Number of stakeholders receiving research information on, and becoming aware of, best management practices for agricultural and natural ecosystems.  
Not reporting on this Output for this Annual Report

**Output #10**

**Output Measure**

- 10. Number of oral or poster presentations at professional scientific meetings resulting from program activities.

<b>Year</b>	<b>Actual</b>
2015	8

**Output #11**

**Output Measure**

- 11. Number of podcasts and web videos resulting from program activities.  
Not reporting on this Output for this Annual Report

**Output #12**

**Output Measure**

- 12. Number of research proposals submitted.

<b>Year</b>	<b>Actual</b>
2015	19

**Output #13**

**Output Measure**

- 13. Number of collaborations and alliances developed with the public and private sector in response to program research needs.  
Not reporting on this Output for this Annual Report

**Output #14**

**Output Measure**

- 14. Number of educational activities in collaboration with the Extension Service personnel to disseminate information to farmers and the general public about research results.

<b>Year</b>	<b>Actual</b>
2015	9

**Output #15**

**Output Measure**

- 15. Number of graduate and undergraduate students involved in research projects.

<b>Year</b>	<b>Actual</b>
2015	12

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of people who adopted recommended practices for the adaptation or mitigation of climate change in their farms.
2	Number of people who established watershed protection practices.
3	Number of people who adopted practices to improve water collection, storage, and reuse efficiency.
4	Number of people who adopted agroforestry practices, soil erosion or water runoff control practices.
5	Number of people who comply with environmental soil erosion and water requirements.
6	Number of people who adopted one or more practices to prevent brush or forest fires.
7	Number of people who prepared a contingency plan for natural disasters or that gets insurance.
8	Number of projects developed as a result of collaborations.
9	Number of peer reviewed and non-refereed publications resulting from program activities.
10	Number of trainings, research demonstration, tours, surveys and meetings with stakeholders to discuss research results, critical issues and priorities.
11	Number of people reporting gained knowledge through podcasts and web videos.
12	Increased public and private sectors involvement in natural resources and environment research program.
13	Number of people reporting willingness to adopt best management practices to improve conservation and efficient use of water.
14	Percent of target audience that report an increased knowledge through trainings, research demonstration, tours, surveys and meetings.
15	Number of students (graduate and undergraduates) receiving training and work experience in this research program.
16	Number of numeric nutrient criteria developed for rivers in Puerto Rico

**Outcome #1**

**1. Outcome Measures**

Number of people who adopted recommended practices for the adaptation or mitigation of climate change in their farms.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	239

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
125	Agroforestry

**Outcome #2**

**1. Outcome Measures**

Number of people who established watershed protection practices.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	202

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
125	Agroforestry

**Outcome #3**

**1. Outcome Measures**

Number of people who adopted practices to improve water collection, storage, and reuse efficiency.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	222

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

**Outcome #4**

**1. Outcome Measures**

Number of people who adopted agroforestry practices, soil erosion or water runoff control practices.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	90

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

125 Agroforestry

**Outcome #5**

**1. Outcome Measures**

Number of people who comply with environmental soil erosion and water requirements.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	85

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
125	Agroforestry

**Outcome #6**

**1. Outcome Measures**

Number of people who adopted one or more practices to prevent brush or forest fires.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	182

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources

**Outcome #7**

**1. Outcome Measures**

Number of people who prepared a contingency plan for natural disasters or that gets insurance.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	79



**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
132	Weather and Climate

**Outcome #8**

**1. Outcome Measures**

Number of projects developed as a result of collaborations.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	25

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

125 Agroforestry

**Outcome #9**

**1. Outcome Measures**

Number of peer reviewed and non-refereed publications resulting from program activities.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	8

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
136	Conservation of Biological Diversity
211	Insects, Mites, and Other Arthropods Affecting Plants
403	Waste Disposal, Recycling, and Reuse

**Outcome #10**

**1. Outcome Measures**

Number of trainings, research demonstration, tours, surveys and meetings with stakeholders to discuss research results, critical issues and priorities.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	11

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

There is the need to increase outreach efforts throughout diverse educational activities to reach major audiences and obtain stakeholder inputs.

**What has been done**

Outreach efforts were increased through different activities across disciplines and groups of interest. Major efforts were devoted to workshops, seminars, field days and meetings. Meanwhile several training and research demonstrations were conducted. A video about the irrigation requirements in a changing climate was posted on You Tube with great audience response.

**Results**

Public awareness and interest about the research program has grown as shown by the number of participants, stakeholder inputs and consultations reported.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
136	Conservation of Biological Diversity
211	Insects, Mites, and Other Arthropods Affecting Plants

403 Waste Disposal, Recycling, and Reuse

**Outcome #11**

**1. Outcome Measures**

Number of people reporting gained knowledge through podcasts and web videos.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	1000000

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Education is a first line of defense for the conservation and management of natural resources. Since the web is an efficient and inexpensive tool to reach mass audiences and maximize outreach efforts, several scientists in this research program have used this technology to reach a major audience.

**What has been done**

Outreach of research activities in this area has been varied and performed across disciplines, particularly in interdisciplinary groups. This activity has been documented through web videos, web seminars and podcasts. In particular, a special seminar series, Coloquio AgroAmbiental, was developed to discuss major issues regarding natural resources and the environment.

**Results**

Several seminars, videos and a symposium have been presented. Research results have been successfully disseminated mainly through web sites, podcasts and blogs. For example, the number of visitors per page is as follows: Colloquium (8 videos, 55,083 hits; Recycling, Manure, and Sustainable Agriculture (1 million+); Irrigation Requirements in a Changing Climate (1,017); other topics registered 11,000; 19,000 and 65,000+.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

132	Weather and Climate
136	Conservation of Biological Diversity
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
403	Waste Disposal, Recycling, and Reuse
405	Drainage and Irrigation Systems and Facilities

**Outcome #12**

**1. Outcome Measures**

Increased public and private sectors involvement in natural resources and environment research program.

Not Reporting on this Outcome Measure

**Outcome #13**

**1. Outcome Measures**

Number of people reporting willingness to adopt best management practices to improve conservation and efficient use of water.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	100

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The need for better methods for management practices to improve conservation and efficient use of water.

**What has been done**

Several multidisciplinary research studies were conducted in order to develop understanding and efficient technology to improve water conservation and management. Water management and conservation practices have been developed for crops such as vegetables and coffee, and for dairy farms.

### Results

More farmers and producers have understood the importance of proper management of drip irrigation in fruit trees, vegetables and starchy crops. Farmer training in the field was achieved, and the suitability of subsurface micro irrigation for vegetables and farinaceous crop production on the south coast of Puerto Rico was proven. Also proven was the feasibility of using subsurface micro irrigation to produce vegetables and farinaceous crops in rotation for several years on the south coast of Puerto Rico. Development of a web-based site and mobile application for scheduling irrigation in the island is providing vital information for irrigation needs in different agricultural areas.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
405	Drainage and Irrigation Systems and Facilities

### Outcome #14

#### 1. Outcome Measures

Percent of target audience that report an increased knowledge through trainings, research demonstration, tours, surveys and meetings.

#### 2. Associated Institution Types

- 1862 Research

#### 3a. Outcome Type:

Change in Action Outcome Measure

#### 3b. Quantitative Outcome

Year	Actual
2015	83

#### 3c. Qualitative Outcome or Impact Statement

##### Issue (Who cares and Why)

Provide research awareness and better understanding of the impact of agricultural management practices on natural ecosystems.

##### What has been done

Several multidisciplinary trainings, seminars and meetings have taken place to discuss the impact of agricultural management practices on natural ecosystems.

**Results**

Research results have been successfully disseminated through web sites, blogs, seminars, workshops and fact sheets. Trainings, workshops and research demonstrations were held, reaching a wide variety of audiences. Expectations are that attendees increase their knowledge through these outreach activities.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
136	Conservation of Biological Diversity
211	Insects, Mites, and Other Arthropods Affecting Plants
403	Waste Disposal, Recycling, and Reuse

**Outcome #15**

**1. Outcome Measures**

Number of students (graduate and undergraduates) receiving training and work experience in this research program.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	12

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

There is the need to ensure the development of intellectual capital of the natural resources and agricultural sciences workforce in areas relevant to the College of Agricultural Sciences and USDA identified by both federal and local agricultural agencies.

**What has been done**

Funding from research grants has been allocated to assistantships that support student training and provide work experience towards the completion of master's degrees in identified priority need research areas within the agricultural and natural resources sciences.

**Results**

Four students completed their master's degrees; recruitment and retention of talented students interested in completing graduate studies has increased. Students recruited under the program have shown a tendency to pursue graduate studies in disciplines and topics related to the research program.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
136	Conservation of Biological Diversity
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants

**Outcome #16**

**1. Outcome Measures**

Number of numeric nutrient criteria developed for rivers in Puerto Rico

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

To address the problem of elevated nutrient concentrations in streams and lakes, the United States Environmental Protection Agency (USEPA) established the National Nutrient Criteria Program in 1998. The criteria constitute numeric thresholds established to protect the ecological integrity of water ecosystems and prevent impairment to their designated uses. These guidelines enable local regulatory agencies to identify, prioritize, and develop quantifiable metrics for the restoration of nutrient impacted waters.



### **What has been done**

Two research projects were established with the following goals: 1) Develop numeric reference criteria for nutrients [nitrogen (N) and phosphorus (P)], and 2) Develop numeric nutrient criteria for reservoirs of Puerto Rico.

### **Results**

Results from the latter study validated numeric nutrient criteria estimates developed by our research group in a previous study using a statistical distribution approach. The confirmation of previous estimates using a biological index component was pivotal in the regulatory effort. Research results have been published in one master thesis and two peer reviewed publications. The Environmental Quality Board of Puerto Rico recently modified the Water Quality Standards of Rivers and Streams of the island as related to nutrients.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
112	Watershed Protection and Management

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

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

### **Brief Explanation**

The 2015 Caribbean drought is an ongoing drought affecting the Caribbean islands. A major reason for the drought is a scarcity of precipitation due to a particularly harsh El Niño since March 2015. The situation is further aggravated by the presence of an abnormal amount of dust and dry air over the southern Atlantic.

This year, Puerto Rico was hard hit by the drought. According to the United States Drought Monitor, about 20 percent of the island has been experiencing "extreme" to "exceptionally extreme" drought. By August, about 1.3 million (of 3.5 million) residents were affected by water rationing. The water crisis comes at a time when Puerto Rico suffers a financial debt crisis, compromising its response to the drought and the available resources for many state agencies, including the University of Puerto Rico.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

No evaluation of this program was conducted by PRAES this year.

In the case of research, stakeholders input has been documented and collected through conference and seminar commentaries and evaluations, website usage (including questions, comments and requests), use of models developed and participation in training and

workshops. Participants have identified major concerns and research needs in the following areas: climate change impact on the agricultural industry and the ecosystems, a digitalized inventory of agricultural land use in crop production and other land uses; appraisal of this resource availability and suitability for specific uses; pollution prevention and mitigation practices for soil; watershed protection and management based on conservation practices; development of sustainable agricultural production practices to protect and enhance natural ecosystems; and prevention and control of invasive species through management approaches for biodiversity conservation and restoration. Another major concern is the current epidemic of diseases transmitted by insect vectors such as *Aedes aegyptii*. Regulatory personnel, interagency groups and local press have been requesting information and action on our part to deal with this health problem.

Results of the evaluation will be available through the PRAEXS-website to target key decision makers, colleagues, program participants and beneficiaries. Evaluation results will be used to improve the research program activities to enhance and achieve the stated goals and objectives according to stakeholders needs.

### **Key Items of Evaluation**

Research should be focused on identifying feasible options for soil health improvement, watershed protection and management, conservation of biodiversity, and providing sustainable approaches that are adaptable and affordable over the long term. Projects focused on long-term research should be highly encouraged as well as partnering research programs and institutions with existing research networks.

**V(A). Planned Program (Summary)**

**Program # 5**

**1. Name of the Planned Program**

Food Safety, Science and Technology

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
502	New and Improved Food Products	0%		44%	
511	New and Improved Non-Food Products and Processes	0%		3%	
512	Quality Maintenance in Storing and Marketing Non-Food Products	0%		3%	
701	Nutrient Composition of Food	0%		40%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	100%		10%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	10.0	0.0	1.1	0.0
<b>Actual Paid</b>	9.6	0.0	1.4	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.2	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
518066	0	50991	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
259033	0	31089	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**

- Worked in collaboration with communication media.
- Worked in partnership with other agencies to develop educational programs.
- Offered Safe Food Handling Curriculum to consumers. This curriculum includes Food safety for pregnant women, food safety around the year, and food safety during emergencies.
  - Exhibits, information centers, radio shows, among others.
  - Offered Food Safety Course to Food Establishment managers PRAES and personnel of other agencies.
    - Trainings: Emphasis on institutions that serve At-Risk Population in the Food Code regulations, Hazard Analysis and Critical Control Points, Food Defense, and others.
    - Trainings in HACCP, GAP, GMP
    - Research in new product development using wastes from food industry and agricultural commodities

**2. Brief description of the target audience**

- Extension professionals and other professionals
- Parents and persons that plans/buys/prepares food for the family
- Consumers with an emphasis on At-risk Population
- Persons in Charge of Retail Food Establishments
- 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**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	7708	3135	363	0

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

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
Actual	0	2	2

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of consumers completing one Food Safety educational curriculum for consumers.

Year	Actual
2015	1224

**Output #2**

**Output Measure**

- Number persons in charge of food establishments completing Food Safety Course.

Year	Actual
2015	3299

**Output #3**

**Output Measure**

- Number of persons completing courses, workshops, and seminars offered by the program.  
 Not reporting on this Output for this Annual Report

**Output #4**

**Output Measure**

- Number of active research projects in the program.

<b>Year</b>	<b>Actual</b>
2015	3

**Output #5**

**Output Measure**

- Number of non-refereed publications based on research results.

<b>Year</b>	<b>Actual</b>
2015	1

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of consumers that adopted one or more food handling practices.
2	Number of participants that approved the certification exam.
3	Number of participants that adopted three or more of eight selected food handling practices recommended by the Food Code.
4	Number of enterprises impacted by the program that improved their food technologies based on scientific research
5	Number of improvement in technologies developed that focused on safety or shell life extension.

## **Outcome #1**

### **1. Outcome Measures**

Number of consumers that adopted one or more food handling practices.

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	952

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

CDC (Center for Disease and Prevention) estimates that each year roughly 1 in 6 Americans (or 48 million people) gets sick, 128,000 are hospitalized, and 3,000 die of foodborne diseases. Langiano, et al (2012) concluded the home environment is a proper site for the spread of pathogens that may cause food borne illnesses. They also established that consumers should be informed about safe food handling practices at home to lower the risk of foodborne illness.

#### **What has been done**

PRAES Home Economists offer Families a food safe curriculum. This curriculum includes three units that consist of 11 lessons from which Home Economists select and customize their course according to their clientele's needs. Among the topics covered are: Four Steps for Food Safety, Food Safety for Mom's to Be and Moms with Infants, Food Safety for Susceptible Population, Food Safety during Emergencies, and Safe Handling at the Vegetable Garden.

#### **Results**

1224 consumers completed the Family Be Food Safe curriculum. 78% adopted at least one safe food handling practice. Among the practices that were adopted: 74% clean and sanitized food contact surfaces; 67% washed their hands frequently before and during food preparation; 58% avoided cross contamination by separating ready to eat food from food that would be cooked; 30% used food thermometer to measure cooking temperatures. 17 moms to be completed the Protect your Baby curriculum. 71% adopted at least one safe handling practice. 71% cleaned and sterilized baby bottles; 59% handled maternal milk safely; 100% handled infant food safely.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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712 Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**Outcome #2**

**1. Outcome Measures**

Number of participants that approved the certification exam.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	3269

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Puerto Rico Health Department adopted the Food Code in the year 2000, which requires that all Person in Charge of a Food Establishment must demonstrate knowledge in proper food safety procedures. In the Food Code of 2013, it requires that they must have completed a food Safety Course. Puerto Rico Health Department require that this course is taken every 3 years in order for food managers keep updated on changes occurring in the regulation.

**What has been done**

PRAES has 8 Home Economists that offer Food Safety courses throughout the Island. Course complies with Food Code requirements. In order to approve the course, participants must pass a test with a score of 70% or more. PR Health Department Inspectors participated in these courses speaking about Puerto Rico's Regulation for Food Establishments and what are they looking for when performing an inspection.

**Results**

3299 Food Managers completed the Food Safety Course. 99% passed Food Safety Course Test with 70% or more.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

**Outcome #3**

**1. Outcome Measures**

Number of participants that adopted three or more of eight selected food handling practices recommended by the Food Code.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	2878

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

According to CDC (2014) more than half of foodborne illness outbreaks occur in restaurants and delis. They also report that food establishments with a food safety certified manager had a lower risk for outbreaks. Sit-down and ethnic restaurants are more prone to have an outbreak. This may be due to more complex food preparation.

**What has been done**

PRAES prepared food safety course that consists of 12 lessons. It contains all the knowledge areas required by the Food Code 2013. As part of our course the PR Health Inspector offers a lesson in which he/she discusses the Inspection Sheet that is used during their visit and what they expect during an inspection to a food establishment. During this lesson, the Health Inspector applies the knowledge obtained in the prior lessons in an inspection. Food Managers are able to clarify any doubts they may have about the application of proper food safety procedures learned during the course.

**Results**

3299 Food Managers completed the Food Safety Course. 87% adopted at least 3 of the safe food handling practice including: 88% washed their hands during food preparation; 85% used separate cutting boards to avoid cross contamination; 69% used a food thermometer; 75% used disposable gloves or other utensils to handle ready to eat food; 83 washed and sanitized utensils and food contact surfaces; 72% hired pest control professional; 86% used a safe procedure when thawing frozen food; 83% held hot food at 135°F; 80% prepared a written procedure for cleaning vomit and feces. As part of a HACCP consultation to one of our Home Economists, the owner of an establishment which prepared sushi obtained Health Department Permit. His permit was conditioned because he did not comply with the Food Code. Once he prepared his HACCP plan and obtained his permit he achieved an exclusive contract to distribute sushi for a local supermarket chain. This increased his earnings.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

#### Outcome #4

##### 1. Outcome Measures

Number of enterprises impacted by the program that improved their food technologies based on scientific research

##### 2. Associated Institution Types

- 1862 Research

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2015	0

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

The mission of the FSST 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.

###### **What has been done**

During this year a total of four seminars were offered on the Food Safety Program. Training was offered in food safety and related topics (HACCP and SQF, GAP and GMP). In an effort to help the food industry in the improvement and development of new food, a total of 24 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.

###### **Results**

Nearly sixty food industry employees and farmers were trained. Nutritional Fact Analysis, Nutritional Fact information, Microbiological Analysis, water activity measurement and percent alcohol determination was conducted as requested by fourteen industries.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
511	New and Improved Non-Food Products and Processes
512	Quality Maintenance in Storing and Marketing Non-Food Products
701	Nutrient Composition of Food
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

#### Outcome #5

##### 1. Outcome Measures

Number of improvement in technologies developed that focused on safety or shelf life extension.

##### 2. Associated Institution Types

- 1862 Research

##### 3a. Outcome Type:

Change in Knowledge Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2015	3

##### 3c. Qualitative Outcome or Impact Statement

###### Issue (Who cares and Why)

The CDC reports that every year there are approximately 48 million cases of foodborne illnesses, 128,000 hospitalizations, and 3,000 deaths from foodborne microorganisms. In addition acid whey is a by-product obtained from the manufacture of Puerto Rican White cheese. Only 10% of the milk used is converted to cheese, the rest becomes acid whey that needs to be treated and disposed. Countries such as Mexico, Spain, Italy, and Thailand among others consume pumpkin flowers, leaves, and immature fruits as part of their culinary dishes or because of their medicinal properties. Even though pumpkin flowers and immature fruits are considered an important source of nutrients and antioxidants, at the present they are not exploited in the Caribbean's islands.

###### What has been done

Three studies have been conducted addressing food safety and improvement of technologies using by products of the food industry creating new products with extended shelf life. One non-referred publication was obtained; results from the preliminary study of pumpkins flowers were presented at a scientific conference.

###### Results

Microbiological analyses were conducted in three hydroponic fresh produce farms. In another study, two formulations using acid-whey by-products were successfully developed: yogurt and frozen dessert. In the third study, flowers from five different genotypes: 'Bush White Scallop', 'Early Prolific Straightneck', experimental line 'E1101-1', 'Verde Luz', and 'Taina Dorada' were used for proximate analysis. Preliminary proximate analyses of flowers obtained values of 93.14% moisture, 0.64% ash, 0.85% protein, and 0.32% fat. Shelf life of flowers ranged from 3 to 5 days under refrigeration before having a deteriorated appearance and weight loss was 0.50 g per day. Initial vitamin C content ranged from 13.68 to 14.88 mg/100g and after storage dropped 50% to a value ranging from 6.44 to 8.72 mg/100g.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
701	Nutrient Composition of Food

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Populations changes (immigration, new cultural groupings, etc.)

##### Brief Explanation

Puerto Rico, as in many other places, is going through a major financial crisis, which may or may not be solved in the near future. We expect changes in the amount of money assigned to our government's budget. This will have a domino effect on agencies and instrumentalities, as well as public policies and regulations.

Puerto Rico went through a major drought during which there were municipalities that could be from 2 to 3 days without water supply. This affected significantly the food establishments. Health Department required that the establishment must be kept closed if there wasn't potable water for food preparation or for rest rooms. So many went out of business.

On occasions, the support needed from the Municipal governments may vary if their interests are different from the ones established by our program; especially when part of the program is based on a different paradigm. It could take time for individuals, including our personnel, to change their attitudes and adopt a new model.

#### V(I). Planned Program (Evaluation Studies)

##### Evaluation Results

We are now coordinating an evaluation of the Food Safety Course. We are going to have focus groups which will include: Health Inspectors, Food Managers, and Home Economists.

No evaluation was performed on the research side this year.

##### Key Items of Evaluation



**V(A). Planned Program (Summary)**

**Program # 6**

**1. Name of the Planned Program**

Community Resources for Sustainable Development, Agricultural Economics, Marketing and Added Value

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
601	Economics of Agricultural Production and Farm Management	0%		25%	
602	Business Management, Finance, and Taxation	20%		5%	
604	Marketing and Distribution Practices	0%		25%	
605	Natural Resource and Environmental Economics	0%		10%	
606	International Trade and Development Economics	0%		5%	
607	Consumer Economics	0%		5%	
608	Community Resource Planning and Development	40%		10%	
610	Domestic Policy Analysis	0%		15%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	30%		0%	
805	Community Institutions, Health, and Social Services	10%		0%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	27.6	0.0	0.8	0.0
<b>Actual Paid</b>	27.2	0.0	0.6	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	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
1469750	0	51532	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
734875	0	37757	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

- Use of Economic Development "tool box" material that empowered community participants to take advantage of the endless amount of possibilities for community oriented economic initiatives
- Mentorship and companionship efforts vis-à-vis entrepreneurial workshops
- Establishment of local farmer's and artisan's markets
- Community assemblies, gatherings, and other meetings to establish rapport and explore needs and aspirations
- Conference/training in areas of social investment, marketing, market study and analysis, self-employment opportunities identification, community based business and empowerment
- Participative Action Research strategies such as "reading the streets", participant observation, ethnographies, life histories, focus groups, informal interviews, and reflexive diaries
- Establishment of strategic alliances with government agencies, non-government organizations and community institutions to collaborate in the promotion of community based economic initiatives
- Development of educational material such as curriculum and modules
- Establishment of community coalitions with volunteer organizations, community services organizations, institutions, and other agencies
- Seminars with community services institutions that offer assistance in case of disaster or emergency, including volunteer organizations, non-profit groups and government agencies
- Research was undertaken to develop new market niches and promising new products, as well as to determine farmers' costs of production, consumer preferences, marketing margins, and farmers' and other participants' shares in the marketing channels of selected agricultural commodities.
- Studies were undertaken to identify the diverse strategies that local food system stakeholders are currently using or might use to create and manage ongoing or potential change, and their information needs.
- Research was undertaken to improve natural resources and environmental use by farmers and to support policy-making processes by government officials in order to achieve greater economic and material sustainability.
- A new project proposal to improve the MS degree program in Agricultural Economics. was prepared and funded . This project is partly aimed at engaging students in the acquisition and use of analytical and leadership skills. A yearly congress was planned in which research results will be presented by students and scholars.
- In collaboration with Extension faculty and agents, results were translated into recommendations for farmers and community organizers.
- Publications were prepared and presentations made to producer associations and agricultural professionals.



**2. Brief description of the target audience**

Community participants (i.e., individuals and families), community leaders, extension professionals and other professionals; Farmers, community organizers, producer associations, academic community, local and state government officials.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	8689	2758	418	0

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

**Patent Applications Submitted**

Year: 2015

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	1	8	9

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of refereed publications.

Year	Actual
2015	9

**Output #2**

**Output Measure**

- Number of scientific presentations in scientific meetings

<b>Year</b>	<b>Actual</b>
2015	5

**Output #3**

**Output Measure**

- Number of non-refereed publications (posters, newspaper articles, etc)

<b>Year</b>	<b>Actual</b>
2015	11

**Output #4**

**Output Measure**

- Number of new technology generated (models, software, processes)  
Not reporting on this Output for this Annual Report

**Output #5**

**Output Measure**

- Number of persons trained in community-based business.

<b>Year</b>	<b>Actual</b>
2015	100

**Output #6**

**Output Measure**

- Number of leaders trained in community organization and empowerment (at least four workshops).

<b>Year</b>	<b>Actual</b>
2015	326

**Output #7**

**Output Measure**

- Number of leaders trained in emergency and disaster situations (at least four workshops).

<b>Year</b>	<b>Actual</b>
2015	287

**Output #8**

**Output Measure**

- Number of participants attending workshops coordinated with Extension on program's results

<b>Year</b>	<b>Actual</b>
2015	290

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of stakeholders gaining knowledge about new information/tools (medium term measure) aimed at improving: consumption decisions, production management, marketing decisions, institutional arrangements and organizational capacities, public policy decisions, natural resources and environmental management.
2	Number of adopters of new or improved practices/tools in consumption decisions, production management, marketing decisions, institutional arrangements and organizational capacities, public policy decisions, natural resources and the environmental management.
3	Total number of participants in new market-niches improved as a result of program research.
4	Number of persons applying the recommended practices in the process of developing a community-based business.
5	Number of community-based businesses established.
6	Number of community projects established to benefit the community.
7	Number of leaders participating actively in the design and implementation of community projects.
8	Number of communities that developed an emergency and safety plan.
9	Number of families that developed an emergency and safety plan.

**Outcome #1**

**1. Outcome Measures**

Number of stakeholders gaining knowledge about new information/tools (medium term measure) aimed at improving: consumption decisions, production management, marketing decisions, institutional arrangements and organizational capacities, public policy decisions, natural resources and environmental management.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1200

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
607	Consumer Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis

## **Outcome #2**

### **1. Outcome Measures**

Number of adopters of new or improved practices/tools in consumption decisions, production management, marketing decisions, institutional arrangements and organizational capacities, public policy decisions, natural resources and the environmental management.

### **2. Associated Institution Types**

- 1862 Research

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	5

### **3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
605	Natural Resource and Environmental Economics
607	Consumer Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis

**Outcome #3**

**1. Outcome Measures**

Total number of participants in new market-niches improved as a result of program research.

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	62

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Farmers in Puerto Rico need access to new market niches for their food crops to partially counter the vulnerability of local production to competition from abroad.

**What has been done**

A socioeconomic study of the recently established Family Markets was conducted. The Family Markets are a type of farmers market sponsored by the PR Dept. of Agriculture and the PR Family Dept. with USDA support.

**Results**

Preliminary results suggest the markets have been highly successful, making a positive impact on employment, providing small and mid-sized farmers with access to another marketing channel, and giving NAP and WIC consumers access to high quality produce at good prices. Based in part on these results, federal support for the Family Markets initiative was continued.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
604	Marketing and Distribution Practices
607	Consumer Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis

**Outcome #4**

**1. Outcome Measures**

Number of persons applying the recommended practices in the process of developing a community-based business.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	40

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
608	Community Resource Planning and Development

**Outcome #5**

**1. Outcome Measures**

Number of community-based businesses established.

**2. Associated Institution Types**

- 1862 Extension



**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	12

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Puerto Rico has entered its 10th year in negative growth. Puerto Rico's CRD keeps focusing in organizing communities and their leadership while giving follow up to potential community entrepreneurs already trained to develop new economic ventures.

**What has been done**

Our field personnel continue working with participants who have been trained in "The Community Entrepreneurial Tool Box" in previous years in order to create new community based businesses.

**Results**

Among those who adopted the recommended practices and those that have created new community based business, a total of 158 persons have reported to have economically benefited from emerging economic initiatives.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
608	Community Resource Planning and Development

**Outcome #6**

**1. Outcome Measures**

Number of community projects established to benefit the community.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
------	--------

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The redirection of PRAES field personnel duties from providing training to that of providing mentorship to already trained community members has resulted in an increase in community projects.

**What has been done**

Direct mentoring initiatives by part of the PRAES field personnel has increased community organization. This has led to a substantial increase in community projects to deal with threats and safeguards. Among the most significant are the establishment of vocational and entrepreneurship initiatives for female single headed households in the towns of Hatillo and San Sebastián; the ?rescue? of agricultural vocational programs and re-establishment of school and rehabilitation farms in the towns of San Germán, Lajas and Ponce; and the creation of a community Agricultural Reserve in the town of Las Piedras where over 900 acres of prime farmland in El Yunque National Rain Forest buffer zone was protected from an urban development project.

**Results**

There has been a 20% increase in new community projects in relation to last year results.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
608	Community Resource Planning and Development
805	Community Institutions, Health, and Social Services

**Outcome #7**

**1. Outcome Measures**

Number of leaders participating actively in the design and implementation of community projects.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	406

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

**Outcome #8**

**1. Outcome Measures**

Number of communities that developed an emergency and safety plan.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	4

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
608	Community Resource Planning and Development

**Outcome #9**

**1. Outcome Measures**

Number of families that developed an emergency and safety plan.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	85

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Due to its location in the Caribbean, Puerto Rico is exposed to telluric movements and extreme weather such as floods and hurricanes. It is common that vulnerable populations build their households in marginal land that are subjected to floods and landslides. Accordingly, at PRAES we give special emphasis to help communities identify and prepare for emergencies and disaster.

**What has been done**

Since community emergency plans take longer to develop due to the need to organize communities first, gather the necessary data, and coordinate with government agencies, Family?s Emergency and Safety plans are a first step to give community members a considerable level of readiness for disaster and emergencies management. PRAES has increased its efforts in helping community members develop Family?s plans in a right direction to increase community members? knowledge and commitment toward disaster readiness.

**Results**

The number of family?s emergency and safety plans have almost doubled in a year period.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
608	Community Resource Planning and Development

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Other (new recruitments)

### **Brief Explanation**

In 2015 Puerto Rico experienced its longest drought in 30 years with 2.8 million of its 3.6 million population being directly affected by the drought. Puerto Rico is entering its 10<sup>th</sup> year in economic recession, characterized by the government inability to emit bonds and the menace of a default due to unmanageable repayment terms. While these factors may have influenced program outcomes it is difficult to assess, without a more focused evaluation, which processes were affected. On a positive note, one new researcher was hired during last year and a second one will probably be hired during 2016. Given that this program has few researchers, this represents an important increase in human resources.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

Evaluation is planned for every two years. Therefore, an evaluation will be conducted for FY 2016. The Department of Agricultural Economics and Rural Sociology, through its Research Committee, is in the process of evaluating its research efforts and results. This will be an indirect way of evaluating much of the present program's research activities as many of the Department's researchers that have outstanding research projects, have most of their projects under the present program.

### **Key Items of Evaluation**

**V(A). Planned Program (Summary)**

**Program # 7**

**1. Name of the Planned Program**

Sustainable Energy

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
401	Structures, Facilities, and General Purpose Farm Supplies	15%		0%	
402	Engineering Systems and Equipment	10%		0%	
403	Waste Disposal, Recycling, and Reuse	65%		0%	
405	Drainage and Irrigation Systems and Facilities	10%		0%	
	<b>Total</b>	100%		0%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	6.2	0.0	0.7	0.0
<b>Actual Paid</b>	6.4	0.0	0.0	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	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
345378	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
172689	0	0	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**

Included in our workshops and meetings aspects of sustainable energy with emphasis on structures, waste management and irrigation equipment, and energy conservation.  
 Established collaborations with government agencies (Environmental Quality Board, Puerto Rico Electric Power Authority, Department of Agriculture, Environmental And Natural Resources, Department of Education, Puerto Rico Aqueducts and Sewage Authority, USEPA; USDA; NRCS; and others) and with our partners in the University of Puerto Rico and other educational institutions.  
 Designed and made plans that included and promoted energy sustainability and efficiency in structures, waste management systems and irrigation systems (new facilities or improvement to existing facilities)  
 Prepared research proposals related to energy generation and nutrient recovery from agricultural wastes and optimization of biodigesters designs.

**2. Brief description of the target audience**

Extension professionals, government personnel (professional), professionals from the private sector and farmers.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	786	1817	0	0

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

**Patent Applications Submitted**

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of clients that participated in workshops and meetings offered which include aspects of energy sustainability and efficiency.

<b>Year</b>	<b>Actual</b>
2015	783

**Output #2**

**Output Measure**

- Number of government agencies and partners in the University of Puerto Rico and other educational institutions that collaborate in projects that promote energy sustainability and efficiency.

<b>Year</b>	<b>Actual</b>
2015	22

**Output #3**

**Output Measure**

- Number of active research projects in the program.

<b>Year</b>	<b>Actual</b>
2015	0

**Output #4**

**Output Measure**

- Number of new proposals submitted targeting the program's priorities.

<b>Year</b>	<b>Actual</b>
2015	1

**Output #5**

**Output Measure**

- Number of popular (non-refereed) publications based on research results.  
Not reporting on this Output for this Annual Report



**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of clients that adopted designs and plans that include and promote energy sustainability and efficiency in structures, waste management systems and irrigation systems (new facilities or improvement to existing facilities).
2	Number of projects, initiatives and clients that adopted designs, plans, or energy alternatives, that have been developed as a result of partnerships between government agencies, the University of Puerto Rico, and other educational institutions that collaborate and promote energy sustainability and efficiency.

## **Outcome #1**

### **1. Outcome Measures**

Number of clients that adopted designs and plans that include and promote energy sustainability and efficiency in structures, waste management systems and irrigation systems (new facilities or improvement to existing facilities).

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	41

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Hydroponics vegetable farm with two structures (18,000 square feet) using nutrient film technique to produce lettuce, cilantro, coriander and tomatoes. The facilities are of difficult access to the energy grid. Therefore, they use solar energy with 16-bateries and a diesel generator, which requires a huge amount of diesel fuel to operate. Besides, it does not work on cloudy days.

#### **What has been done**

The owners visited the local Extension office. The Ag Agent visited the farm to check the installation and the system to confirm that works properly. He adjusted the parameters in the equipment configuration that controls the generator and explained how it works. The owner mentioned that despite the fact that he has the systems installed 5-years ago in one visit, he finally understood the operation of the solar system.

#### **Results**

The owners now benefited from the knowledge gained and savings in fuel of approximately \$1,200 annually. In top of that, 430 gallons of diesel fuel are no longer burned, which represents about 10,000lbs. CO2 that does not reach the atmosphere.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
401	Structures, Facilities, and General Purpose Farm Supplies

## **Outcome #2**

### **1. Outcome Measures**

Number of projects, initiatives and clients that adopted designs, plans, or energy alternatives, that have been developed as a result of partnerships between government agencies, the University of Puerto Rico, and other educational institutions that collaborate and promote energy sustainability and efficiency.

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	26

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

The high cost of energy in Puerto Rico still been an issue for the people, the industries and farmers. During 2015, the average KWh in Puerto Rico was \$0.22/kwh, for the agriculture industries and \$0.21/kwh for the residential class, which is almost 2 times higher than the USA average (except Hawaii) \$0.11/kwh. This still forces farmer to do changes on their farms and houses to prevail on their business.

#### **What has been done**

We prepared educational material on solar energy systems, efficient use of energy and use of renewable energy on their houses and farms. These material was delivered to agricultural agents so they offered workshops to it's clientele. Then, they established collaborations with other government agencies and private sector to promote a good environment between them and the farmers so they can apply the solar technology to their business in the farms and homes.

#### **Results**

As an example, we can mention the agricultural agent for the town of Gurabo offered advice on efficient use of energy and the use of photovoltaic solar energy at home and for the irrigation systems on the farmer greenhouse. As result of the advice and collaboration with the private sector and other government agencies, the farmer established a photovoltaic solar energy system with 10.0 Kw capacity at home. The energy consumed on their home and business was produced on the roof of his own home. This system reduced his energy bill from \$480.00 per month to \$164.00 per month, which is savings of almost \$3,800.00 a year. Other example was at Hatillo town, where one dairy farmer established a 53.0 kW photovoltaic solar system on the dairy facilities to cover all the energy needs of the farm. This system reduced the farm energy bill from \$1,200 to \$10.00 per month, which is savings of \$14,280.00 per year.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
405	Drainage and Irrigation Systems and Facilities

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

- Economy
- Public Policy changes
- Government Regulations

##### Brief Explanation

A weak economy is a factor that precludes people from investing in improving their infrastructures. The strong recession and increasing cost of inputs, may limits farmer's ability to adopt other types of technologies with long term payoffs. When a general feeling is that economy are strong, people tend to be more aggressive with infrastructure investments. The availability of economic incentives is decisive in making final decisions that require capital investment, and the government of PR have been decreasing the amount of incentives in the last year. Changes in public policies also make people change priorities and postpone projects.

#### V(I). Planned Program (Evaluation Studies)

##### Evaluation Results

Our Agricultural Agents offered 33 workshops and established 22 collaborations with other Universities or Government Agencies on the island which included aspects of renewable energy, in which they reported 786 direct contacts and 1,817 indirect contacts, and reported that 725 of them presented an increase in knowledge in the area. We planned that 50 people may adopt designs or improvements to existing facilities that promote energy sustainability, and PRAES Agents reported that 41 people made changes, almost 82%. The other outcome was the number of projects, initiatives as a result of partnerships between government agencies, the private sector and the University of PR that collaborate to promote energy sustainability and efficiency; we planned 20 for 2015 and the PRAES Agents reported 26 projects or initiatives that were developed or are still being developed by those partnerships and collaborations.

##### Key Items of Evaluation

N/A

**V(A). Planned Program (Summary)**

**Program # 8**

**1. Name of the Planned Program**

Adult and Childhood Obesity

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
703	Nutrition Education and Behavior	50%		0%	
704	Nutrition and Hunger in the Population	20%		0%	
724	Healthy Lifestyle	30%		0%	
	<b>Total</b>	100%		0%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	8.8	0.0	0.0	0.0
<b>Actual Paid</b>	9.6	0.0	0.0	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	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
521314	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
260657	0	0	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

1. Developed joint action at community level to promote and implement physical activity programs and nutrition education for adults, parents, caregivers and kids.
2. Taught about the importance of healthy practices at work and breakfast, lunch, and snacks in schools and other institutions to comply with communication 2-2007-2008 that rules expenditure and consumption of food and beverages minimum nutritional value.
3. Taught participants about portion size control, adequate meal patterns, supermarket tours, meal planning, shopping lists to ensure healthy food choices within a budget.
4. Demonstrated easy, healthy food recipes to encourage the consumption of fruit, vegetables and whole grain foods.
5. Encouraged the importance of gardening to increase physical activity and the consumption of fruit, vegetables and healthy foods.
6. Demonstrated the importance of reducing refined sugars and saturated fats to prevent obesity and the development of chronic diseases.

**2. Brief description of the target audience**

Children/youth and their families, caregivers, and adults.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	6754	1727	20176	3023

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

**Patent Applications Submitted**

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	1	0	1

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of children and youth that completed non-formal nutrition and physical activity education courses.

<b>Year</b>	<b>Actual</b>
2015	5307

**Output #2**

**Output Measure**

- Number of adults, parents and caregivers that completed non-formal nutrition and physical activity education courses.

<b>Year</b>	<b>Actual</b>
2015	1352

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of children and youth that reported eating more healthy foods.
2	Number of adults/caregivers that reported eating more of healthy foods.
3	Number of children and youth that reported eating less of foods/food components which are commonly eaten in excess.
4	Number of adults, parents and caregivers that reported eating less of foods/food components which are commonly eaten in excess.
5	Number of children and youth that reported increasing their physical activity.
6	Number of children and youth that reported engaging daily in 60 minutes or more of physical activity.
7	Number of adults, parents, caregivers that understand the benefits of spending time together in physical activity.
8	Number of children and youth who learned about the importance of gardening to promote physical activity and improved nutrition.
9	Number of adults, parents and caregivers who learned about the importance of gardening to promote physical activity and improved nutrition.
10	Number children and youth who increased the consumption of 5 or more fruits and vegetables per day.
11	Number adults, parents and caregivers who increased the consumption of 5 or more fruits and vegetables per day.
12	Number children and youth who ate breakfast.



## **Outcome #1**

### **1. Outcome Measures**

Number of children and youth that reported eating more healthy foods.

### **2. Associated Institution Types**

- 1862 Extension

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	2902

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

According to YBRSS 2013, more than 22% of Puerto Rican youth were consuming 3 or more cans or soda a day while the daily consumption of fruits and vegetables were low, which might contribute to 25% of youth being overweight or obese.

#### **What has been done**

Nutrition education curriculum was designed to promote healthy eating and physical activity for school-aged children and teens. Professionals were educated in the areas of portion control, healthy snacks, reading food labels and healthy choices and behaviors such as having breakfast and consuming more fruits and vegetables using My Plate. The involvement of 4H children and youth in Nutrition Knowledge, healthy eating adoption and physical activity competitions contributed to positive changes toward healthy eating practices in this group. Training of teens to teach youngest on healthy recipe preparations, sugar content in common drinks among other practices, helped to change behaviors in teens, children and caregivers.

#### **Results**

There was 55% increase in healthy food selection in children and youth who participated in nutrition education courses. In addition, 48% of children and youth reduced the intake of sugary beverages following nutrition education and there was a 52% increase in the consumption of water.

As a success story, a group of six teens were selected to teach 116 children in healthy eating by teaching recipes, My Plate and why to avoid unhealthy foods. The six teens improved their eating habits to select healthier foods while all the children impacted expressed they wanted to consume less sugary foods.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
724	Healthy Lifestyle

**Outcome #2**

**1. Outcome Measures**

Number of adults/caregivers that reported eating more of healthy foods.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1082

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Adult obesity rates (BRFSS, 2013) continue to rise in Puerto Rico being 27.9% of the population considered as obese and 38.7% as overweight. The low consumption of healthy foods such as fruits and vegetables is seen in this group. Only 17.7% of the Puerto Rican Adults consume the recommendation of 5 fruits and vegetables a day. More that ¾ of the population do not engage in daily physical activity.

**What has been done**

A complete nutrition education and physical education curriculum was designed for adults and caregivers. Home economists were trained by the Nutrition Specialist. Nutrition education and activities related focused on the importance of consuming healthy foods for weight management and reduction of health risk factors were taught to adults and caregivers.

**Results**

80% of the adults who completed the nutrition education course successfully adopted healthy eating habits. Following nutrition education, 68% of adults and caregivers ate more fruits and vegetables than before education. There was a 78% increase in the consumption of water. Nutrition education was useful for adoption of healthy practices in this group. Reinforcement in nutrition education activities must be kept as an ongoing program.

A major success in our nutrition education program was the campaign developed to reduce the consumption of sugary drinks by counting the number of sugar teaspoons that different beverages contain. Following nutrition education, 78% of adults and caregivers reported the reduction in the consumption of sugary beverages.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
724	Healthy Lifestyle

#### Outcome #3

##### 1. Outcome Measures

Number of children and youth that reported eating less of foods/food components which are commonly eaten in excess.

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

<b>Year</b>	<b>Actual</b>
2015	2309

##### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
724	Healthy Lifestyle

**Outcome #4**

**1. Outcome Measures**

Number of adults, parents and caregivers that reported eating less of foods/food components which are commonly eaten in excess.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	676

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
724	Healthy Lifestyle

**Outcome #5**

**1. Outcome Measures**

Number of children and youth that reported increasing their physical activity.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	3144

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

According to 2013 BRFSS and YBRFSS, 72% of the adults and 82% of the youth are not doing any type of daily physical activity.

**What has been done**

The immersion of physical activity in the nutrition education curriculum, "hands-on" activities and teaching the how much physical activity can be while cleaning the house, dancing or gardening has been done.

**Results**

More than half (59%) of the children and youth who participated and completed the nutrition and physical activity courses increased daily physical activity.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

**Outcome #6**

**1. Outcome Measures**

Number of children and youth that reported engaging daily in 60 minutes or more of physical activity.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
------	--------

2015 407

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

**Outcome #7**

**1. Outcome Measures**

Number of adults, parents, caregivers that understand the benefits of spending time together in physical activity.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	365

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
703	Nutrition Education and Behavior

724 Healthy Lifestyle

### **Outcome #8**

#### **1. Outcome Measures**

Number of children and youth who learned about the importance of gardening to promote physical activity and improved nutrition.

#### **2. Associated Institution Types**

- 1862 Extension

#### **3a. Outcome Type:**

Change in Action Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	2857

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

Home and school gardening is barely done in Puerto Rico. A meta-analysis published in the Journal of the Academy of Nutrition and Dietetics (2009, O'Brien et al.) demonstrated that "garden-based nutrition intervention programs may have the potential to promote increased fruit and vegetable intake among youth and increased willingness to taste fruits and vegetables among younger children?". The importance of gardening to promote the consumption of healthy foods and fiber, as well as a way to increase physical activity was needed in Puerto Rico.

##### **What has been done**

Immersion of the physical activity benefits while gardening in the prevention of adult and youth obesity in the nutrition education curriculum helped participants to learn about gardening and started preparing their own home and/or school gardens. Nutrition education was offered on the importance of gardening to obtain the healthy foods and nutrients needed for weight management in adults and the growth and development of children. Posters and flyers were designed to reinforce the importance of good nutrition through gardening activities. An exercise program encouraging resistance, flexibility and aerobic activities in the garden were given. This new program also included the preparation of healthy recipes using the foods grown in the community garden.

##### **Results**

From the participants who completed the nutrition and physical activity courses, there was 54% increase in the number of participants who learned about the importance of gardening to promote physical activity and improve nutrition. Compared to results from last year, the percentages improved from 46% to 54%, indicating the success of our ongoing nutrition education program.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

#### Outcome #9

##### 1. Outcome Measures

Number of adults, parents and caregivers who learned about the importance of gardening to promote physical activity and improved nutrition.

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

<b>Year</b>	<b>Actual</b>
2015	858

##### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle



**Outcome #10**

**1. Outcome Measures**

Number children and youth who increased the consumption of 5 or more fruits and vegetables per day.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	424

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
724	Healthy Lifestyle

**Outcome #11**

**1. Outcome Measures**

Number adults, parents and caregivers who increased the consumption of 5 or more fruits and vegetables per day.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	740

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
724	Healthy Lifestyle

**Outcome #12**

**1. Outcome Measures**

Number children and youth who ate breakfast.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	579

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

## Results

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

### V(H). Planned Program (External Factors)

#### External factors which affected outcomes

- Economy
- Competing Programmatic Challenges

#### Brief Explanation

1. Puerto Rico economic situation is facing a difficult time. Community participants are forced to find extra jobs and attendance to education programs has been reduced. There are limitations in the amount of education materials to be prepared due to reduced funds.
2. Many employees are retiring and the positions are vacant and no hiring. It is more difficult to outreach community.

### V(I). Planned Program (Evaluation Studies)

#### Evaluation Results

An outcome evaluation was conducted on a sample of youth participants at the Annual 4-H Nutrition Competition. All of the participants completed the nutrition education course "Muévete a la Sana Alimentación" (Move to a Healthy Eating). The course consisted of five lessons that teach about the importance of healthy eating and physical activity, portion sizes, drinking more water and My Plate for Puerto Rico. From the total 61 4-H clubs that participated in the competition, 20 4-H clubs (33%) were selected to participate in the outcome evaluation. These were four clubs from each of the five Regions that composed the Puerto Rico's Extension Service. A total of 57 4-H members completed the questionnaire (from ages 10 to 18 years old). The questionnaires were administered by the clubs' leaders, within one month following the nutrition competition, in order to evaluate if dietary behavior changes were adopted and maintained. The questionnaire asked about changes in the consumption of fruits, vegetables, whole grain cereals, water, milk and physical activity based on the following options: more than before, same as before, less than before and don't consume. Results showed that 53% reported eating more fruits after participating in the nutrition education course and the competition, 38% drink more low fat milk than before, 37% eat more whole grain cereal than before and 21% eat more vegetables than before. Still 18% reported not eating any vegetable. The main reported change was in the consumption of water, were 65% reported drinking more water than before. Similarly, 65% reported doing more physical activity than before the nutrition course and the competition.

In order to evaluate the participants eating practices compared to the daily recommendations for nutrition and physical activity, participants answered how often they

accomplished these recommended practices (every day, sometimes, never). More than 86% of the participants ate breakfast every day, 46% engaged in 60 minutes of physical activity every day, 19% reported consuming two servings of vegetable daily, 25% reported drinking three glasses of milk daily and 26% reported eating three servings of fruits every day.

Participants were also asked to evaluate their typical food plate and describe it based on the following descriptions: half of the plate is fruits and vegetables, less than half of the plate is fruits and vegetables and does not include fruits and vegetables. Results showed that 46% of the participants reported that half of their typical food plate includes fruits and vegetables. Only 6% indicated that their plate has no fruits and vegetables.

Statistical analysis of t-test were performed to determine the level of significance of the following data (P<0.05). The results showed a significant improvement in the consumption of fruits and water, and physical activity. However, more emphasis on activities that will be focused on the adequate consumption of vegetables and low fat milk should be reinforced in order to improve these dietary practices. So far, these results (increase consumption of fruits and water, and physical activity) were comparable with the nationwide outcomes previously presented in this report.

<u>Variable</u>	<u>Media</u>	<u>Std. dev.</u>	<u>P-value</u>
Fruits	3.53*	0.50	<0.0001
Vegetables	2.82	0.97	<0.0001
Whole grain cereals	3.28	0.65	<0.0001
Water	3.63*	0.52	<0.0001
Milk	2.86	1.18	<0.0001
Physical Activity	3.53*	0.78	<0.0001

N=57 (The media: 4=more than before; 3=same as before; 2=less than before; 1=don't consume)

\* Significantly consumed more than before nutrition education.

### Key Items of Evaluation

Dietary behaviors changes after a nutrition education course and participation in a 4-H nutrition competition, among 4-H members from Puerto Rico.

**V(A). Planned Program (Summary)**

**Program # 9**

**1. Name of the Planned Program**

Family Well-being

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
607	Consumer Economics	10%		0%	
724	Healthy Lifestyle	20%		0%	
801	Individual and Family Resource Management	30%		0%	
802	Human Development and Family Well-Being	40%		0%	
	<b>Total</b>	100%		0%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	20.2	0.0	0.0	0.0
<b>Actual Paid</b>	22.4	0.0	0.0	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	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
1210987	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
605494	0	0	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**

Educational campaigns, conduct meetings, courses, workshops, orientations, collaborations with government agencies, Training-the-trainers, Billboards with educational materials and informative brochures, curriculum and educational development, and radio programs participation.

**2. Brief description of the target audience**

Extension agents, FCS professionals, specialists, professionals from other agencies and institutions, parents, families at risk, individuals, children, youth, volunteers, elders, and at risk population and general public.

**3. How was eXtension used?**

eXtension was not used in this program.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	19436	2500	5207	2421

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

**Patent Applications Submitted**

Year: 2015

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	2	0	2

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of persons that completed courses in parenting and related areas.

<b>Year</b>	<b>Actual</b>
2015	1462

**Output #2**

**Output Measure**

- Number of persons that completed courses in aging aspects.

<b>Year</b>	<b>Actual</b>
2015	1597

**Output #3**

**Output Measure**

- Number of persons that completed the Consumer Education course.

<b>Year</b>	<b>Actual</b>
2015	1004

**Output #4**

**Output Measure**

- Number of persons that completed individual and family resource management course.

<b>Year</b>	<b>Actual</b>
2015	137

**Output #5**

**Output Measure**

- Number of persons that completed non-formal health education and health promotion programs.

<b>Year</b>	<b>Actual</b>
2015	991

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of persons that reported improved parenting skills.
2	Number of persons that gained knowledge in aging aspects.
3	Number of consumers that adopted the practice of preparing their individual family budget.
4	Number of persons that reduced their risk levels upon the completion of one or more recommended lifestyles.
5	Number of consumers that adopted savings practices through goods and services selection process (Consumer Education course)



**Outcome #1**

**1. Outcome Measures**

Number of persons that reported improved parenting skills.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2015	816

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The increase of family violence in Puerto Rico is a huge social problem that is affecting the quality of life of families, children, individuals and also communities. Statistics from 2015 showed that 5,121 women have been victims of domestic violence by their partners.(Source: P.R. Police, Statistics Division,2015)

**What has been done**

To attend this issue, we implemented a family violence prevention campaign at state level. Sixty-two (62) Extension educators of the FCS program developed this campaign through different methodologies and educational strategies, involving mass media communications, establishment of government collaborations and community leaders to disseminate the information.

**Results**

As a result of the campaign, two-hundred-forty-three(243) collaborations were established, fifty-eight(58) educational campaigns were developed, one-hundred-sixty-five(165) information?s centers were developed, workshops, courses and orientations were offered to the at risk population. Eleven?thousand-four-hundred-twenty-one (11,421) women and families were benefit through educational campaigns and workshops, and eight-hundred-sixteen (816) parents improved parenting skills. We will continue offering education and dissemination of information in family relations aspects as well as anger management for the development of the necessary skills among this population.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
802	Human Development and Family Well-Being

**Outcome #2**

**1. Outcome Measures**

Number of persons that gained knowledge in aging aspects.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1527

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

The elderly population in Puerto Rico is growing at a higher rate than the total population. Data from 2013 show that 14.5% of Puerto Ricans are 65 years or older. This population group faces a range of health (physical, emotional), and social problems to meet their needs.

**What has been done**

A curriculum in elder aspects was developed by the gerontology specialist. Fifty-two FCS professionals were trained in elder aspects to work with this population.

**Results**

As a result, 1,597 elder people benefited. Of that 1,527 elders reported they have gained knowledge and skills about the importance of a good mental health, and how to prevent depression. One hundred eighty-six (186) reported an improvement of their self-esteem. Some of the participants in these courses commented on the benefits they have received from the educational courses: "Thank you for sharing these themes with us. We are valuable people." One participant that recently experienced the loss of his wife expressed "With this educational course I have feel alive again. I waited for the meetings every week." A third participant pointed out: "I have really enjoy these classes since it is not easy to open ourselves to other when we feel lonely, in my case because my daughter lives in the US and we do not communicate very often." The participants highly recommended the program to other people.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
802	Human Development and Family Well-Being

**Outcome #3**

**1. Outcome Measures**

Number of consumers that adopted the practice of preparing their individual family budget.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	160

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
801	Individual and Family Resource Management

**Outcome #4**

**1. Outcome Measures**

Number of persons that reduced their risk levels upon the completion of one or more recommended lifestyles.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	588

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
724	Healthy Lifestyle

**Outcome #5**

**1. Outcome Measures**

Number of consumers that adopted savings practices through goods and services selection process (Consumer Education course)

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	694

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

## Results

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Populations changes (immigration, new cultural groupings, etc.)

##### Brief Explanation

Economic issues, migration of families and individuals, and weather conditions might have affected the active participation of people in educational programs. In addition, there is still a vacancy in the Consumer Education Specialist position.

#### V(I). Planned Program (Evaluation Studies)

##### Evaluation Results

An evaluation is planned for FY 2016.

##### Key Items of Evaluation

**V(A). Planned Program (Summary)**

**Program # 10**

**1. Name of the Planned Program**

Strengthening Youth Life Skills, Leadership and their Community

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
806	Youth Development	100%		0%	
	<b>Total</b>	100%		0%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	35.7	0.0	0.0	0.0
<b>Actual Paid</b>	35.0	0.0	0.0	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	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
1526154	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
685194	0	0	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

- Conferences or workshops training in life skills, leadership, and community services. •
- Camping and outdoor activities. •
- Curriculum developed in life skills, leadership and community service. •

Participate in mass communication to promote 4-H as a positive organization for youth. Communications projects in radio, press and TV/public presentation. youth and adults volunteers developed skills for a positive contribution to society. activities/events.

- Projects where
- Contests
- Field trips / fairs / Exhibitions activities/events.

Sponsored by Merck pharmaceutical, University of Puerto Rico- Medical Sciences Campus, ASSMCA and PRAES we prepare 20 extension educators and volunteers to facilitate Media Detective Community-Evidenced Based program in the five PRAES regions. We showcased the achievements in a Research Congress about Kids, Teens and Communities celebrate at University of PR, Mayaguez Campus.

Youth Voice: Youth Choice strategy was reinforced to provide youths' leaders the opportunity to design and deliver 4-H initiatives using different strategies in schools and communities. Through a collaboration project with PR Health Department and UPR Comprehensive Cancer Center, 55 4-H leaders received training to be spokespersons for two important health campaigns around the island: How to prevent VPH and Water vs Sweet Beverages. Also 50 teen-teachers delivered healthy lifestyle initiatives in communities and schools, sponsored by 4-H National Council and Walmart Foundation. Eight youth leaders become the voices and faces of a TV commercial and also the voices for a radio campaign. Twenty five (25) youth sponsored by US Forest Service-Children Forest received training to understand the impact of climate change in El Yunque National Rainforest and to deliver this information to the community using photo voice techniques. UPR, Rio Piedras Campus Jose M. Lazaro Library main lobby provided to exhibit their photos for a month.

The National 4-H State Conference is our platform to develop and reinforce communication skills. From the 125 youth participating in the State Conference, 25 youth leaders' participants improved their communication skills and felt confident in public speaking. Among them, Melanie González who was selected for the National for 4-H Congress Youth Leadership Team and José Muñiz was selected to be a round-table facilitator in the 2016 National 4-H Conference. Melanie's mother said "it was amazing, when my daughter began in 4-H she did not speak. In 4-H she has improved her communication skills and learn to manage the fear of public speaking".

4-H leaders participating in healthy lifestyles initiatives offered 385 presentations in schools and communities. Also they were presenters in the National Cardy Day organized by the PR Cardiologist Association. The association estimated that our 4-H youth leaders presentations were attended by 2,500 youth and adults during the day. Gabriela Rivera 4-H member said "my family can't believe it was me. I am very shy. Now I stand in front of any group to speak, I feel confident thanks to 4-H". Two hundred sixty (260) teen leaders deliver education on healthy living. They reached 5,817 kids and youth more than what was planned. This effort is supported by the National 4-H Council and Walmart Foundation.

## **2. Brief description of the target audience**

Youth and 4-H members, Extension professionals (agricultural agents and specialists, home economists), professional government personnel, volunteers, and community residents.

## **3. How was eXtension used?**

eXtension was not used in this program

## **V(E). Planned Program (Outputs)**

### **1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	5790	0	42574	9546

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

Year: 2015  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
<b>Actual</b>	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of children/ youth who participated in life skills and subject matter educational programs designed to teach basic life skills.

<b>Year</b>	<b>Actual</b>
2015	3812



**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	As a result of experiences in a 4H program or project, the number of participants who consider the consequences of their choices.
2	As a result of experiences in a 4-H program or project, Number of participants who are confident to speak in front of groups
3	As a result of experiences in a 4H program or project, the number of participants who can work well with others.
4	As a result of experiences in a 4H program or project, the number of participants who helped with a project that made a difference in their community.
5	As a result of experiences in a 4-H program or project, Number of participants who can work successfully with adults

**Outcome #1**

**1. Outcome Measures**

As a result of experiences in a 4H program or project, the number of participants who consider the consequences of their choices.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1115

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

**Outcome #2**

**1. Outcome Measures**

As a result of experiences in a 4-H program or project, Number of participants who are confident to speak in front of groups

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1576

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Improve communication skills in youth help the program to deliver educational messages with positive feedback from different audiences. It also gives the opportunity for youth to develop self-confidence in public speaking. When youth understand how their voices can be a powerful tool to become a community leader and make an impact in their communities, they assume their roles as leaders and spokespersons with a greater commitment.

**What has been done**

The 4-H program offers different strategies that provide the opportunity to develop communication skills. We reinforced the strategy Youth Voice: Youth Choice, providing our youths" leaders the opportunity to design and deliver 4-H initiatives using different strategies in schools and communities. Through a collaboration project with PR Health Department and UPR Comprehensive Cancer Center we trained 55 4-H leaders to be spokespersons for two important health campaigns around the island: How to prevent VPH and Water vs Sweet Beverages. Also we trained 50 teen-teachers to deliver healthy lifestyle initiatives in communities and schools, sponsored by 4-H National Council and Walmart Foundation. Other 25 youth sponsored by US Forest Service-Children Forest were trained to understand the impact of climate change in El Yunque National Rainforest and to deliver this information to the community. In addition to these initiatives, the National State Conference is our platform to develop and reinforce communication skills.

**Results**

During the year, the 4-H leaders participating in healthy lifestyles initiatives offered 385 presentations in schools and communities. Also they were presenters in the National Cardy Day organized by the PR Cardiologist Association; the association estimated that our 4-H youth leaders presentations were attended by 2,500 youth and adults during the day. Gabriela Rivera 4-H member said "My family can't believe it was me. I am very shy. Now, I stand in front of any group to speak, I feel confident thanks to 4-H. Eight youth leaders become the voices and faces of a TV commercial and also the voices for a radio campaign. The 125 youth participating in 4-H State Conference had the opportunity to reinforce their communication skills, as a result 25 Youth leaders participating in the conference improved communication skills and feel confident when speaking to groups. Among them, Melanie González was selected for the National for 4-H Congress Youth Leadership Team and Jose Muñiz was selected to be a roundtable facilitator in the 2016 National 4-H Conference. Melanie's mother said "It was amazing. When my daughter began in 4-H, she did not speak. In 4-H she has improved her communication skills and learn to manage the fears to speak in front of groups?."

**4. Associated Knowledge Areas**

**KA Code**    **Knowledge Area**  
806           Youth Development

**Outcome #3**

**1. Outcome Measures**

As a result of experiences in a 4H program or project, the number of participants who can work well with others.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1973

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

**KA Code**    **Knowledge Area**  
806           Youth Development

**Outcome #4**

**1. Outcome Measures**

As a result of experiences in a 4H program or project, the number of participants who helped with a project that made a difference in their community.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	934

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

**Outcome #5**

**1. Outcome Measures**

As a result of experiences in a 4-H program or project, Number of participants who can work successfully with adults

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1866

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Economy

**Brief Explanation**

At this moment, we have an unstable economy. This has affected youth participation in educational activities.

**V(I). Planned Program (Evaluation Studies)**

**Evaluation Results**

An electronic system is been developed for 4-H members registration. It is expected that during FY 2016, the evaluation will be included in this system following a pre and post-test design. This will also include a profile of members' participation in the different educational activities with the purpose of follow-up their progress in the program.

**Key Items of Evaluation**

N/A

**V(A). Planned Program (Summary)**

**Program # 11**

**1. Name of the Planned Program**

Global Food Security and Hunger

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
131	Alternative Uses of Land	10%		0%	
205	Plant Management Systems	20%		0%	
307	Animal Management Systems	20%		0%	
501	New and Improved Food Processing Technologies	5%		0%	
603	Market Economics	10%		0%	
606	International Trade and Development	5%		0%	
610	Domestic Policy Analysis	5%		0%	
704	Nutrition and Hunger in the Population	25%		0%	
	<b>Total</b>	100%		0%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2015	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	3.7	0.0	0.0	0.0
<b>Actual Paid</b>	5.4	0.0	0.0	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	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
290160	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
145080	0	0	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**

Technical production, trainings and meetings  
 Building Capacity Workshops  
 Demonstrations  
 Meetings, visits and guidance to farmers and communities  
 Educational materials  
 In 2015, 14 community gardens around the island were established as a result of an agreement with the Federal Strike Force (Nutrition Service, Rural Community Development, NRCS, FSA, RD and the State Department of Agriculture). This group provided the funds while PRAES was in charge of the know how and the education component. In 2016, we expect to expand this effort.

**2. Brief description of the target audience**

Farmers, housewives, community leaders, agricultural entrepreneurs, government professionals, and professionals from the private sector

**3. How was eXtension used?**

N/A

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2015	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	9721	14975	2139	0

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

**Patent Applications Submitted**

Year: 2015



Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2015	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of agricultural enterprises feasibility studies.  
Not reporting on this Output for this Annual Report

**Output #2**

**Output Measure**

- Number of youth participating in food system educational program.

Year	Actual
2015	3127

**Output #3**

**Output Measure**

- Number of adults participating in food system knowledge and skill enhancement programs.

Year	Actual
2015	4788

**Output #4**

**Output Measure**

- Number of first detectors trained in early detection and rapid response of plant pests, animal pests and diseases.

Year	Actual
2015	1

**Output #5**

**Output Measure**

- Number of communities trained in agricultural disaster preparedness.

<b>Year</b>	<b>Actual</b>
2015	12

**Output #6**

**Output Measure**

- Number of food security extension publications and presentations.  
Not reporting on this Output for this Annual Report

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of individuals that increased their knowledge about international trade and development
2	Number of public policy issues related with national food security that were reviewed or proposed.
3	Number of farmers that adopted one or more recommended post-harvest practices.
4	Number of fallow "cuerdas"(acres) sowed or prepared for animal production or other agricultural production.
5	Number of consumers that adopted the food basket as a guide for food security at the household level.
6	Number of home gardens established.
7	Number of acres in conservation tillage or other BMP.
8	Number of new or improved value-added products that can be sold by producers (and other members of the food supply chain).
9	Number of marketing agreements established between local farmers and distributors or other components of the food supply chain.
10	Number of producers and other members of the food supply chain that have increased revenue.
11	Number of communities that have written agriculture and food considerations into disaster preparedness plans or procedures.
12	Number of networks prepared to mitigate biological and abiotic disruptions
13	Number of youth that improved knowledge of food systems.
14	Number of adults improved knowledge of food systems.
15	Number of food councils and institutes created to promote practical food systems policies.
16	Number of research and extension advisory councils and boards.
17	Number of communities that retained farm lands due to educational interventions.

### **Outcome #1**

#### **1. Outcome Measures**

Number of individuals that increased their knowledge about international trade and development

Not Reporting on this Outcome Measure

### **Outcome #2**

#### **1. Outcome Measures**

Number of public policy issues related with national food security that were reviewed or proposed.

#### **2. Associated Institution Types**

- 1862 Extension

#### **3a. Outcome Type:**

Change in Action Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	29

#### **3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
131	Alternative Uses of Land
704	Nutrition and Hunger in the Population

**Outcome #3**

**1. Outcome Measures**

Number of farmers that adopted one or more recommended post-harvest practices.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	271

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
501	New and Improved Food Processing Technologies

**Outcome #4**

**1. Outcome Measures**

Number of fallow "cuerdas"(acres) sowed or prepared for animal production or other agricultural production.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1846

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
131	Alternative Uses of Land
307	Animal Management Systems

**Outcome #5**

**1. Outcome Measures**

Number of consumers that adopted the food basket as a guide for food security at the household level.

Not Reporting on this Outcome Measure

**Outcome #6**

**1. Outcome Measures**

Number of home gardens established.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	25

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
704	Nutrition and Hunger in the Population

**Outcome #7**

**1. Outcome Measures**

Number of acres in conservation tillage or other BMP.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	768

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
205	Plant Management Systems
307	Animal Management Systems

**Outcome #8**

**1. Outcome Measures**

Number of new or improved value-added products that can be sold by producers (and other members of the food supply chain).

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	16

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
501	New and Improved Food Processing Technologies

**Outcome #9**

**1. Outcome Measures**

Number of marketing agreements established between local farmers and distributors or other components of the food supply chain.

**2. Associated Institution Types**



- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	32

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
501	New and Improved Food Processing Technologies
603	Market Economics

**Outcome #10**

**1. Outcome Measures**

Number of producers and other members of the food supply chain that have increased revenue.

Not Reporting on this Outcome Measure

**Outcome #11**

**1. Outcome Measures**

Number of communities that have written agriculture and food considerations into disaster preparedness plans or procedures.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	5

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
610	Domestic Policy Analysis

**Outcome #12**

**1. Outcome Measures**

Number of networks prepared to mitigate biological and abiotic disruptions

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
610	Domestic Policy Analysis

**Outcome #13**

**1. Outcome Measures**

Number of youth that improved knowledge of food systems.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	2924

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
704	Nutrition and Hunger in the Population

**Outcome #14**

**1. Outcome Measures**

Number of adults improved knowledge of food systems.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	1700

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
704	Nutrition and Hunger in the Population

**Outcome #15**

**1. Outcome Measures**

Number of food councils and institutes created to promote practical food systems policies.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	7

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
610	Domestic Policy Analysis

**Outcome #16**

**1. Outcome Measures**

Number of research and extension advisory councils and boards.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	13

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

**KA Code**    **Knowledge Area**  
610            Domestic Policy Analysis

**Outcome #17**

**1. Outcome Measures**

Number of communities that retained farm lands due to educational interventions.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2015	5

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

In the past 20 years, Puerto Rico has lost 34% of its farming land. In the municipality of Las Piedras alone has lost a 47% of its total land area (Ag Census). Besides is one of eight municipalities around El Yunque National Rain Forest with 8,788 acres of farm land threaten by the urban development; which means, that won't be available for food production.

**What has been done**

After nine long years of implementing different educational methodologies and strategies; mainly using the PRAES curriculum Communities to the Rescue of Land. The local leaders, farmers, Soil Conservation District and the local Ag Agent collaborated in this effort and created the logo "Ni una pulgada más de tierra agrícola para la siembra de cemento". Not an inch of farm land to plant cement.

**Results**

The approval of a senate project 1002 to declare La Hermosura Farm (910 acres) as a farm reserve. This a high value land (Clasificación A-1), in the El Yunque buffer zone. The surrounding farming enterprises kept their operation (3-dairy, one beef farm). Thirty farmers benefited who are member of the United Las Piedras Farmers Organization and other farmers from the eastern part of the Island. Mrs. Genoveva Lozada, president of the farmer organization, said "it was a long fight but at end, we prevailed. We are working in a plan to buy farm land to cultivate, that presently are private land.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
131	Alternative Uses of Land

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy

**Brief Explanation**

Crop production was severely affected by drought as a result of the climate change.

**V(I). Planned Program (Evaluation Studies)**

**Evaluation Results**

No evaluation was conducted during 2015.

**Key Items of Evaluation**

N/A

## VI. National Outcomes and Indicators

### 1. NIFA Selected Outcomes and Indicators

<b>Childhood Obesity (Outcome 1, Indicator 1.c)</b>	
2902	Number of children and youth who reported eating more of healthy foods.
<b>Climate Change (Outcome 1, Indicator 4)</b>	
0	Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits.
<b>Global Food Security and Hunger (Outcome 1, Indicator 4.a)</b>	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
<b>Global Food Security and Hunger (Outcome 2, Indicator 1)</b>	
0	Number of new or improved innovations developed for food enterprises.
<b>Food Safety (Outcome 1, Indicator 1)</b>	
0	Number of viable technologies developed or modified for the detection and
<b>Sustainable Energy (Outcome 3, Indicator 2)</b>	
0	Number of farmers who adopted a dedicated bioenergy crop
<b>Sustainable Energy (Outcome 3, Indicator 4)</b>	
0	Tons of feedstocks delivered.