

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Global Food Security and Hunger - Plant genetic resources, breeding and production systems

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			10%	
202	Plant Genetic Resources			40%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			8%	
204	Plant Product Quality and Utility (Preharvest)			7%	
205	Plant Management Systems			35%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	11.3	0.0
Actual Paid	0.0	0.0	8.5	0.0
Actual Volunteer	0.0	0.0	1.0	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
0	0	991738	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	958375	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

- Acquired, evaluated, conserved and distributed plant germplasm
- Developed and released sweet chili pepper lines, cultivars and germplasm
- Improved bean yield potential; identified and implemented 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 a survey of nutrient status in soil and plant tissue in farm fields for arracacha
- Presented research results in local, national, regional and international scientific meetings
- Published research results in local newspapers, bulletins, proceeding and refereed journals
- Celebrated joint field days, seminars and commodity meetings with PRAES and PR Department of Agriculture (PRDA).
 - Continued identifying critical issues of this program area 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

Targeted audience consists of farmers, government professionals, legislators, county agents, scientists, USDA professionals, professionals from the private sector and nonprofit organizations.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2014
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	10	10

V(F). State Defined Outputs

Output Target

Output #1

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 #2

Output Measure

- Number of participants in the field days coordinated with Extension or the Department of Agriculture

Year	Actual
2014	592

Output #3

Output Measure

- Number of students attending field days to seed production fields, germplasm collections and other experimental fields.

Year	Actual
2014	30

Output #4

Output Measure

- Number of refereed publications.

Year	Actual
2014	10

Output #5

Output Measure

- Number of non-refereed publications.

Year	Actual
2014	24

Output #6

Output Measure

- Number of presentations in scientific meetings.

Year	Actual
2014	27

Output #7

Output Measure

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

Year	Actual
2014	2

Output #8

Output Measure

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

Year	Actual
2014	4

Output #9

Output Measure

- Number of new varieties released by PRAES

Year	Actual
2014	2

Output #10

Output Measure

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

Year	Actual
2014	16

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of stakeholders to adopt the proposed BMPs.
2	Records of the sales of seed of improved cultivars at the Substations.
3	Number of locally produced starchy crops with increased output according to Dept. of Agriculture statistics
4	Number of fruit crops with increased output according to Dept. of Agriculture statistic
5	Number of vegetable crops with increased output according to Dept. of Agriculture statistics
6	Number of stakeholders gaining knowledge on organic agricultural practices and acquiring certified organic seeds

Outcome #1

1. Outcome Measures

Number of stakeholders to adopt the proposed BMPs.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Farmers in PR 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 packages of production 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 cabbage was published in 2014 and drafts for watermelon and taniers are in the final stages of completion. BMP are presented and discussed at field days and workshops by the PRAEXS and the Extension Service.

Results

PRAEXS provides vital support for the continued production of traditional crops because seed, and vegetative planting material, is not available from the private sector in PR. The number of stakeholders, especially farmers, attending commodity meetings, field days, seminars and workshops sponsored by PRAEXS continues to increase which suggests an increased willingness of farmers to adopt BMPs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)

205 Plant Management Systems

Outcome #2

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 Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Lack of seeds of improved germplasm continues to be a major production constraint identified by extension agents and growers at our yearly commodity meetings with stakeholders.

What has been done

The Puerto Rico Department of Agriculture contracted the PRAEXS to produce seeds and vegetative planting materials as well as seedlings for distribution to growers. The Isabela Substation increased sales of pigeon pea seeds, beans, Spanish squash, corn, and Crotalaria; as well as planting material of taniens and plantains to farmers. Both the Juana Díaz and the Isabela Substations sold grafted fruit trees of mango, avocado and citrus to growers. The Adjuntas Substation sold 57,850 coffee seedlings, 1,625 citrus trees and 4,364 pounds of coffee seeds. Each of the six substations produces seeds and planting materials for growers.

Results

The land area planted with improved varieties has increased over the past few years. In addition to those mentioned above, records at the substations show that 5,920 lb of beans; 15,538 lb of taniens; 1,915 lb of pigeon peas; and 452 lb of corn from the Isabela Substation were sold to farmers and to the public wishing to expand their plantings.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

Outcome #3

1. Outcome Measures

Number of locally produced starchy crops with increased output according to Dept. of Agriculture statistics

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Production of root and tuber crops has decreased by more than 80% over the past sixty years, while consumption has decreased by a much smaller percent.

What has been done

The PRAES has an active research program on starchy crops. New varieties have either been developed locally or imported. Management practices have resulted in increased yields. Research results on starchy crops, together with outreach by the extension specialist and agents have resulted in increased production.

Results

Puerto Rico Department of Agriculture statistics reflect increases in production of bananas by 68%; sweet potatoes by 21%; yams, 27%; taro, 346%; celeriac, 57%; and cassava, 8% between the 2012/13 and 2013/14 seasons. Plantain and breadfruit production remained the same while tanager production decreased by 10%.

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Number of fruit crops with increased output according to Dept. of Agriculture statistic

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Fruit crops are an important sector of PR's agricultural production. Diseases such as Citrus Greening, Phytophthora root rot of avocados, anthracnose of mangoes, among others, and poor management practices by some farmers, present severe constraints for maintaining or expanding fruit crop production.

What has been done

During the past year research has concentrated on Citrus Greening and other citrus diseases, and on purifying pineapple varieties whose seeds appeared to be degenerating.

Results

Puerto Rico Department of Agriculture statistics reflect increases in the production of pineapple by 163%; watermelon, 95%; honeydew melons, 308%; cantaloupe melons, 300%; papaya, 130%; avocados, 23%; mangoes, 3%; limes, 13%; and grapefruit, 33% between the 2012/13 and 2013/14 seasons. Production of oranges, passion fruit and soursop remained the same during both seasons.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Diseases and insects are major constraints for tropical vegetable production. Crop management and IPM practices need to be evaluated. Supply of certified seed of traditional vegetables (Spanish squash, eggplant, sweet cherry pepper and others should be kept at PRAEXS. Crop management practices for organic farmers and under climate change should be evaluated.

What has been done

Germplasm evaluation of new hybrids and traditional varieties has continued. Irrigation studies in the semi-arid vegetable production region were conducted. Organic seed production of vegetable seeds was continued at the Lajas and Gurabo Substations of the PRAEXS.

Results

Puerto Rico Department of Agriculture statistics reflect increases in the production of sweet pepper by 40%, Spanish squash by 72%, eggplant 39%, onion 42%, cucumber 39%, sweet cherry pepper 69%, lettuce 20%, beans in their pods by 85%, and dry beans by 4% between the 2012/13 and 2013/14 seasons. The production of tomatoes was reduced by 5% and that of cabbage showed a 30% decrease.

4. Associated Knowledge Areas

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

Outcome #6

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

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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. A very small area has been designated as organic farms.

What has been done

Areas within the Gurabo and Lajas Substation of the PRAES 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

Since obtaining the QCS organic certification, 1,709 pounds of 59 different vegetables, culinary herbs and cover crops with the ?USDA Organic? label have been distributed at the Lajas organic seed production farm. Some of the organic seeds produced are for tropical pumpkin, eggplant, okra, upland rice, corn, cilantro, beans, winged beans, cowpea, mucuna, Crotalaria and Canavalia. At Gurabo, planting material and seed of sweet potato, cucumber, sugarcane, sweet cherry pepper, black-eyed pea, and pigeon pea, among others, have also been distributed to interested stakeholders.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Appropriations changes
- Competing Programmatic Challenges

Brief Explanation

No hurricanes hit PR in 2014. Drought conditions were prevalent during the first half of 2014 affecting the island's agricultural production. Puerto Rico has been in a recession for the past nine years. In February 2014, the credit rating companies downgraded Puerto Rico's general obligation bonds and related debt to speculative grade. The debt of the University of Puerto Rico falls into this category known as junk bonds. Most research faculty members will reach retirement age within the next five years, and a very small number of new research faculty are being recruited. A serious problem exists at the Río Piedras Center of PRAEXS with infrastructure (electricity), which affects instruments in the labs as well as telephone and internet communications.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Records of seeds, planting material and tree seedlings of cultivars, lines or varieties developed or evaluated by the PRAEXS are maintained at the substations. The records provide a measure of the impact of the variety development and variety evaluation program. At the Isabela Substation, 15,538 pounds of tanners were provided to the PRDA for distribution to farmers, representing the majority of the healthy planting materials sold to farmers. Records are kept of bean sales (5,960 pounds), tropical pumpkin (76 pounds), corn (452 pounds), cilantrillo (169 pounds) as well as grafted trees of citrus (390 trees), avocados (125 trees) and plantain vegetative planting material. The "USDA Organic" seed distribution at the Lajas Substation is described in Outcome #6, the distribution of coffee seedlings and seed and of citrus plants at the Adjuntas Substation is described in Outcome #2.

In addition, commodity meetings that include farmers, extension specialist, extension agents, Department of Agriculture officials and researchers are being used to obtain inputs concerning new technologies being evaluated and other aspects of the program under evaluation. The information that was obtained is being used to improve the design of the program and dissemination strategies.

Key Items of Evaluation