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: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	18.7	0.0
Actual Paid Professional	0.0	0.0	7.4	0.0
Actual Volunteer	0.0	0.0	6.9	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**
0	0	1077561	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	942569	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

Work continued on the selection and purification of germplasm of traditional crops and development of new varieties. Two new bean varieties, Badillo (light red kidney bean) and Beniquez (white bean) were released by the PRAES and are being sold to farmers.

The introduction and evaluation of different crops continued. In plantains, the FHIA 21 variety with resistance to black sigatoka disease is being evaluated for production and for culinary acceptance by consumers against the Maricongo, the principal variety grown in PR. Other plantain and banana varieties continue to be evaluated for the size of the bunches, disease resistance and culinary traits. In citrus, three rootstocks were released by the PRAEXS: 'Swingle', 'HRS812' and 'Carrizo'. The PR Department of Agriculture, based on the advise of PRAEXS, began implementing a program for the production of propagating material of citrus under protected structures; protocols were established for a certification program. In pineapple, disease-free planting material of Cabezona variety are being sold to farmers. The M-D2 variety has been accepted by farmers as an alternative to the Cabezona.

The INCAPER 8151 tropical robusta coffee variety is being evaluated for production at sea level. The PRAES at Adjuntas produced a total of 300,000 coffee seedlings and 2,600 pounds of coffee seeds for distribution to growers. Active research continues for biological and integrated pest management of the coffee berry borer.

In taniers, seed of the Nazareno yellowed fleshed variety developed by PRAEXS is being produced for a third year for distribution to farmers. A third year of field testing was completed before the release of the Berrocales pigeon pea variety. Organoleptic and nutritional tests were conducted for pumpkin germplasm.

At PRAEXS-Lajas production of certified organic seeds of 45 different crops (vegetables and aromatic herbs) were distributed to farmers and other interested parties in 32 PR municipalities, as well as to Fla, Tx, Ma, Ga, OH, Spain and Venezuela.

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

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

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	8	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of farmers planting newly released varieties developed by PRAES.
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- The number of 'hits' on project-related web sites. Records of the sale of hard copies of AES publications.

Year	Actual
2013	1200

Output #3

Output Measure

- Records of the number and type of germplasm accessions distributed to scientists and the public.

Year	Actual

2013	600

Output #4

Output Measure

- Number of participants in the field days coordinated with Extension

Year	Actual
2013	884

Output #5

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 #6

Output Measure

- Number of refereed publications.

Year	Actual
2013	8

Output #7

Output Measure

- Number of non-refereed publications.

Year	Actual
2013	24

Output #8

Output Measure

- Number of presentations in scientific meetings.

Year	Actual
2013	23

Output #9

Output Measure

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

Year	Actual

2013	9

Output #10

Output Measure

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

Year	Actual
2013	8

Output #11

Output Measure

- Number of new varieties released by AES

Year	Actual
2013	2

Output #12

Output Measure

- Number of collaborations established with public sector institutions to address production problems in agriculture

Year	Actual
2013	18

Output #13

Output Measure

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

Year	Actual
2013	4

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	Percentage of locally produced food.
4	Number of locally produced starchy crops with increased output according to Dept. of Agriculture statistics
5	Number of fruit crops with increased output according to Dept. of Agriculture statistic
6	Number of vegetable crops with increased output according to Dept. of Agriculture statistics

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
2013	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. Technological packages for pumpkin and onions were published in 2013 and a draft for cabbage is in 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 (especially vegetative propagated ?seed?) 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 has continued 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
2013	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 production constraints 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 sexual and vegetative seeds as well as seedlings for distribution to growers. The Isabela Substation sold sexual seeds of beans, and vegetative planting materials of taniers to growers. The Adjuntas Substation produced 130,000 coffee seedlings and 2,600 pounds of coffee seeds for distribution to growers. Each of the six substations produces seeds for growers.

Results
The land area planted with improved varieties has been increasing over the past few years. In addition to the above mentioned, records at the substations show that 5, 721 lbs. of beans and 28,968 lbs. of taniers were sold to farmers and 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

Percentage of locally produced food.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	15

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Puerto Rico imports 85% of the food we consume.

What has been done
The PRAEXS has been conducting its research program to provide farmers with results that will help optimize yields that are economically viable, sustainable and in harmony with the environment.

Results
The PRAEXS has published its research accomplishments in the Journal of Agriculture of the University of Puerto Rico. It also publishes technological packages with BMPs for most of the crops grown in the island. Dissemination of our work with improved varieties and the distribution of seeds produced in the substations has halted the decline of many farming subsectors

4. Associated Knowledge Areas

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

Outcome #4

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
2013	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Production of root and tuber crops has decreased by more than 80% in the past sixty years, while consumption has decreased by a much lower percent.

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

Results
The PR Extension Specialist on starchy crops informs that local production of plantains increased 5%, and that cassava and sweet potato had slight production increases. Bananas, yams, taniers, taro and arracacha did not increase in production in 2013. PR?s Department of Agriculture statistics have not been updated since 2011, leaving us unable to provide more accurate estimates.

4. Associated Knowledge Areas

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

Outcome #5

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
2013	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, Phytophtora root rot of avocadoes, anthracnose of mangoes, among others, and poor management practices by some farmers, offer severe constraints for maintaining or expanding fruit crop production.

What has been done
During the past year research has concentrated in Citrus Greening and other citrus diseases, and in purifying pineapple varieties whose seeds seemed to have been degenerating.

Results
The PR Extension Specialist in Fruit Crops informs that according to his estimates production of pineapples increased 30%, exotic fruits 20%, mango 5 to 10%, papaya 5%, and avocado 2%. Citrus production decreased 10% in 2013. These are in-house estimates since the PR Department of Agriculture statistics have not been updated since 2011.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

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

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

The amount of rainfall in at least two of the research substations increased significantly. The economy of Puerto Rico has been in recession for over six years, thus affecting funding for the PRAEXS. Research faculty have been retiring and in most cases they have not been replaced.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

No formal evaluation results are yet available for this program. A new program coodinator was recently appointed and is currently gathering the data available at the substations on the performance of the seed production and distribution programs. He will also be deciding on a calendar for the collection of stakeholders opinions on the new technologies being validated for the different crops and on other aspects of the program's implementation.

Key Items of Evaluation