



Encouraging careers in food security and safety: A multi-institutional collaborative approach for success in Puerto Rico

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ABSTRACT

World population faces crucial challenges in the demand for food. Consistently, plant and food-borne pathogens pose significant hazards to the food supply. Thus it is crucial to prepare a critical mass of scientists trained to diagnose, analyze, innovate and lead in solving food security and food safety issues. To encourage careers in these two of NIFA-HSI priority science areas, a multi-institutional and interdisciplinary collaborative effort between four HSIs of Puerto Rico, lead by University of Puerto Rico-Mayaguez (UPRM) was proposed. The agreement will open new opportunities to underrepresented Hispanics minorities in the fields of food, agriculture and natural resources. First of all, the project will create ties and new networks among scientists from diverse disciplines (i.e. plant pathology, food technology, microbiology, chemistry, biotechnology, natural resources). Secondly, these actions will prompt professional development and will improve the quality of instruction. Approximately, 760 middle and high school students; 3,024 undergraduate students; five M.S. and one Ph.D., will benefit from the results of this collaborative agreement among scientists from participating HSIs of Puerto Rico. Our final goal will be to increase the critical mass of Hispanic agricultural scientists pursuing careers in NIFA-HSI priority areas of food security, food safety and related disciplines.

PROJECT INFORMATION

LEADER INSTITUTION: UPR-Mayagüez Campus (UPRM)

CO-PI'S FROM PARTNER INSTITUTIONS:

Angela Gonzalez, Ph.D.: Dept. Biology, Chemistry and Environmental Sciences, Inter American University of Puerto Rico-San Germán

Yadira Malavez, Ph.D.: Department of Natural Sciences, UPR-Aguadilla

Cariluz Santiago, Ph.D.: Biotechnology and Agrobiotechnology Research and Learning Center, Pontifical Catholic University of Puerto Rico-Ponce (PUCPR)

SUPPORT PERSONNEL: **Prof. Marian Espola**, Project coordinator; **Lorena Simbaña, M.S.**, Research Assistant; **Prof. Maria del R. Suárez**, Independent evaluator

USDA COLLABORATORS: APHIS, ARS, TARS

NIFA/USDA MISSION AREAS: Food Security and Food Safety

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PROJECT OBJECTIVES AND RELATED ACTIVITIES

This project will encourage careers in two NIFA priority areas, through a multi-institutional and interdisciplinary collaborative effort between four HSIs lead by UPRM.

Objective 1) Train school students of the PR's public education system in disciplines related to food security, food safety, agricultural biotechnology and natural resources, through hands-on activities and learning workshop experiences.

Activities:

a. Summer Camps: Two summer camps will be organized to offer hands-on workshops. Annually, a total of 90 public school students will be trained.

b. Field Trips: Once a year a total of 30 students from schools of the Central region of PR will be invited to UPR-Agricultural Research Station located at Corozal, P.R.

Objective 2) Strengthen ties and capacities of collaborating HIS's to develop and enhance faculty, improve curriculum, introduce new methods of instruction, and acquire equipment to improve infrastructure; to better serve students in areas of (but not limited to) food security and food safety.

Activities:

a. Workshops for faculty professional development: A training workshop series will be organized every summer from 2017 to 2020. Faculty, staff and students of all collaborating HSIs will be trained about innovative cutting-edge trends in science.

b. Curriculum: New trends in science (i.e. metagenomics, phytobiomes) and their relation to food security, food safety issues and climate change impacts will be incorporated in >10 existing courses, impacting > 3,000 students. An on-line course on Fundamentals of Pest Risk Analysis will be designed (UPRM). A new undergraduate research course on Agricultural Biotechnology will be developed at PUCPR to promote research interest among students.

c. Enhancement of Infrastructure: Various pieces of equipment (i.e. thermocycler, microscopes, microcentrifuge) will be acquired to furnish a recently improved and renovated facility for a proposed Tropical Agriculture Ph.D. program at UPRM. The acquired equipment will be used by faculty and students during training workshop series.

Objective 3) Increase by 20% the number of students pursuing careers in food security and food safety from all collaborating HSIs after their participation in practical learning experiences at USDA agencies and the private sector.

Activities:

a. Undergraduate Research Mentoring: Students interested in research will be selected to perform approximately 9 hours of research activities per week each semester.

b. "Role Model" Rotational Seminars: Every semester, seminars will be coordinated among collaborating HSIs, USDA agencies and a non-profit organization to promote interest in careers related to food, agriculture and natural resources. Special consideration was taken to invite Puerto Rican scientists located at USDA agencies. Speakers will illustrate real life scientific dilemmas.

c. Professional Internships for undergraduate students: Annually, the project will provide internships opportunities to selected students interested in areas related to food security, food safety, natural resources and conservation, of collaborating HSIs.

OBJECTIVE 3 ACTIVITIES (CONT.)

d. Other professional and leadership skills development activities: Annually, workshops on communication skills in English, development of effective communication strategies, preparation of scientific presentations, and writing a resume will be organized.

c. Graduate assistantships: Research assistantships will be offered to selected students to pursue M.S. (n=3) or Ph.D. (n=1) in topics related to food security and safety.

PROJECT ACTIVITIES



Fig 1. A) First meeting of project PI's, Co-PI's and collaborators (Dec. 2016). **Students sponsored by the grant. From UPRM: B)** Valerie Gonzalez, Food Science and Technology (MS). **C)** From left to right, Plant Pathology students: Yanira Miranda (MS); Lorena Simbaña, Research Assistant; Patricia Cordero and Yesenia Vélez, 2nd year (BS). **From PUCPR: D)** Luis Cuebas, Undergraduate student at UPR-Agricultural Experiment Station, Juana Díaz, P.R.

Beneficiaries and Expected Impact: This project will impact more than 3,800 Hispanic students. In addition, more than 160 faculty, technicians and graduate students from four HIS's will benefit from this initiative (Table 1).

Table 1. Beneficiaries and Expected Impact: No. of students impacted, supported (in parentheses) in areas of food security and food safety, and level of education by collaborating HIS's.

Collaborating HSIs	K-12	BS	MS	Ph.D.
UPRM	240	500 (11)	(3)	(1)
UPRAG	80	2,080 (11)	-	-
IAUSG	320	400 (11)	(1)	-
PUCPR	120	44 (11)	4 (1)	-
TOTAL	760	3,024 (44)	4 (5)	(1)

Evaluations

- 1. Independent evaluation:** Pre- and post-tests instruments will be used to assess the success of our strategies to attract students into the agricultural sciences.
- 2. Meta-evaluation:** The meta evaluation will be conducted by the Intercultural Development Research Association, a company that will collect and analyze quantitative and qualitative data of project progress.

PROJECT COLLABORATORS

