2013 Rutgers Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

The New Jersey Annual Report of Accomplishments and Results is an integrated report reflecting Cooperative Research and Cooperative Extension programs. The report addresses all of the requirements regarding the use of Hatch Funds, Smith-Lever 3 (b) and (c) and required nonfederal funds. As recommended we have streamlined our report to focus on significant qualitative outcomes. The report reflects the work of the New Jersey Agricultural Experiment Station (NJAES). The mission of NJAES is to enhance the vitality, health, sustainability, and overall quality of the life in New Jersey by developing and delivering practical effective solutions to current and future challenges relating to agriculture; fisheries; food; natural resources; environments; public health; as well as economic, community, and youth development. NJAES through station supported Cooperative Research and Cooperative Extension focuses on innovative approaches to applying the land grant model to address the diverse needs of a highly urbanized state. Stakeholders have been active partners in identifying critical issues to be addressed.

NJAES values the contributions that stakeholders make to ensure that all research and extension projects and programs are relevant and responsive to the needs of New Jersey residents. Cooperative Extension continues to expand its programmatic outreach to fully engage new audiences with a special focus on reaching those who have traditionally been underrepresented and/or underserved. Emphasis is given to increasing our urban audience base and to deliver programs which are culturally appropriate to meet the diverse needs of our many publics.

Planned programmatic focus areas which are being reported against are:
Climate Change-Water Quality & Quantity
Childhood Obesity-Youth/Adult Obesity
4-H Youth Development
Global Food Security and Hunger-Agricultural Viability
Climate Change-Home, Garden and Environment
Global Food Security and Hunger-Integrated Pest Management
Global Food Security and Hunger-Aquaculture
Food Safety
Sustainable Energy

NJAES researchers and extension faculty and staff have concentrated on these focus areas with relevant, innovative science-based educational programming and research solutions to address critical needs identified by New Jersey residents. NJAES has an organizational commitment to diversity which transcends the work of both Cooperative Research and Cooperative Extension. It is evident as we serve the needs of an environmentally, economically, geographic and ethnically diverse state. We meet the needs of agricultural producers who farm on the urban fringe, youth who are challenged by circumstances such as poverty and risks which impede their success, families who are faced with workforce employment issue and a growing number of families who are food insecure. We strive to implement RCE educational programs to meet the needs of underserved and underrepresented audiences and reduce any real or perceived barriers to participation.

Rutgers Cooperative Extension (RCE) is committed to meeting the needs of a diverse Latino community in New Brunswick. Programs span the scope of 4-H Youth Development and life skills to urban gardening and environmental issues with an emphasis on lead abatement of soil. NJAES shared leadership with the New Jersey Farm to School Network to provide youth with healthy foods through

school gardens and farm to school access.

In addition NJAES plays a significant role in the State's economic growth by:

Funding Cutting-edge, innovative research

Fostering technology and innovation transfer to industry

Launching start-up enterprises through incubators and business development support

Providing a well-educated highly skilled workforce

Developing sustainable growth strategies for urban and rural communities.

The Rutgers NJAES water resources programs have addressed innovative methods of optimizing Green infrastructure an approach to wet weather management that infiltrates, evapotranspires, captures and reuses stormwater to maintain or restore natural hydrologies within a watershed (www.epa.gov/greeninfrastructure). Stormwater Management Techniques for Runoff Reduction: 2-hour seminars with demonstrations of permeable pavement and rain gardens were presented to municipal engineers, officials, and other interested parties. Over 80 municipal, county, and state representatives attended this event. This program helped to establish a baseline for evaluating green infrastructure needs in New Jersey. Surveys given to green infrastructure workshop attendees as an online follow-up (n = 51) showed that 83% of respondents would like to have more green infrastructure stormwater management practices installed in their town/county and 72% already had at least one installation in their area.

In addition "Build a Rain Barrel" workshops, offered as part of the Stormwater Management in Your Backyard program, provide information on rain barrel construction and maintenance and include a hands-on training where attendees built 394 rain barrels for installation at their home or business capturing approximately 1,379,000 gallons of stormwater annually.

NJAES researchers, RCE faculty and staff are engaged in research and outreach to address critical issues related to nutrition, diet and health. Family and Consumer Sciences Educators implementedWorking Well in NJ, Worksite Wellness Toolkit with the assistance of the Employers Association of NJ, 24 worksites were identified to participate in the pilot of the toolkit. 2,951 employees completed the Employee Baseline Behavior & Interest Survey: 50% reported feeling stress 3 or more days per week; 26% met the physical activity recommendations of the CDC; 4% consumed the recommended amount of fruit per day; 7% consumed the recommended amount of vegetables per day; 15% smoke cigarettes; 79% are interested in learning about healthy food choices; 85% would like the availability of healthy snacks on the job (vending machine choices); 85% want to increase their level of physical activity; 82% want information about stress.

4-H youth, faculty researchers, graduate and undergraduate students continue their partnership to provide meaningful SET experiences for 4-H youth. Special emphasis has been targeted.to urban and underserved youth. In Passaic and Essex Counties who participated in on campus SET programming have returned to their local communities to serve as 4-H Science Ambassadors to share what they have learned with younger youth.

The fruit and vegetable industry is under increased pressure to improve their food safety practices and to obtain a third party audit confirming they are improving their practices. This is even more important with the enactment of the Food Safety Modernization Act which will be implemented over the next several years. NJAES researchers, RCE Agriculture Agents, staff and Extension Specialists delivered educational outreach utilizing a variety of methods. Growers have made major changes to their operation since this program was initiated. As an example, before the food safety program growers packed cilantro and parsley on packinghouse and garage floors. The product was harvested then dumped on the floors; hosed down then packed in boxes. There was no effort to sanitize floors or other packing surfaces. Growers now pack on tables that can be sanitized. Based on our research on possible pathogens in water some growers are installing sanitation systems on their irrigation water lines and sanitizing their packinghouse water. At least 75 operations have passed a third party audit in 2013. In addition to work with these produces staff have worked with organic growers to complete third party audits.

Base funding from the State of New Jersey and from USDA-NIFA formula funds provides NJAES with a foundation for program development and delivery, while competitive grants, contracts, and gifts increase the scope and impact of research and education programs. "Other" funding includes restricted and unrestricted gifts, income from sales and service activities, and patent and plant licensing income.

County appropriations include salaries paid by counties to Rutgers Cooperative Extension (RCE) faculty and staff. We gratefully acknowledge the personnel, facilities, and other support that each county provides to Rutgers Cooperative Extension. . Increased funding from grants and contracts allowed NJAES to maintain research and extension programs. Grant income is the primary source of support for our nutritional assistance programs, national pesticide testing and pest management services, and continuing professional education programs for New Jersey's farmers, businesses, and residents. Grant income in FY13 also supported important research and extension initiatives in horticulture and plant pathology, climate change, water quality, and other environmental research as well as basic research into metabolic and other influences on human and animal health and wellbeing.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	156.0	0.0	65.0	0.0
Actual	165.0	0.0	46.9	0.0

II. Merit Review Process

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

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

2. Brief Explanation

Peer institutions in the Northeast had an opportunity to review the 2013 Plan of Work update. They are asked to comment on the merit and scientific quality of the plan. In addition to the peer review, both the extension and research committees of the NJ Agricultural Experiment Station Board of Managers serve as internal reviewers.

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
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Survey specifically with non-traditional groups

- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public
- Other (focus group sessions)

Brief explanation.

A variety of methods were utilized to engage our many publics in the program planning and budget process. During 2013 county stakeholder meetings were held throughout the state. The Director and Associate Director of Extension attended a selected number of these meetings. These meetings serve as an open forum for state residents to identify critical issues and needs.

Attendees of stakeholder meetings were representative of the diversity of the state's population. Efforts

Are made to ensure that underserved and/or non-traditional groups and individuals were actively

engaged. These meetings also engaged strategic collaborative partners in identifying research needs and extension program direction. Input from these meetings was used to identify emerging

issues and guide the program and the budget process.

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
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

Brief explanation.

Use Advisory Committees
Use Internal Focus Groups
Use External Focus Groups
Open Listening Sessions
Needs Assessments
Use Surveys
Other

At the county and state levels faculty and staff engage partners and potential clientele in a variety of processes to collect input. Individuals who participate in these processes are those who

serve on advisory boards, special research and extension committees, leaders of commodity groups,

partners who participate on government and service related boards, and individuals who participate in

programs. Opportunities to participate in the process of gathering input are widely publicized through

newsletters, websites, mass media and word of mouth. Engagement of input from groups and individuals who are underrepresented is proactively done to ensure that extension programs and research initiatives are relevant, responsive and address the diverse needs of our many publics.

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
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public

Brief explanation.

Through our county stakeholder meetings individuals participate in open forums where current issues and concerns which impact the county are identified. Stakeholders are active participants in strategic planning processes conducted to identify priority needs which guide research and extension programming. Surveys sent to a variety of different audiences are also utilized to gather data. Extension Specialists engage stakeholders, collaborators, commodity groups, public, private and government officials to identify research needs both applied and basic.

Stakeholder meetings and other processes result in the identification of priority needs on the local and state levels that could benefit from Cooperative Extension programs and or Cooperative Research solutions. Our partners in the educational process are key to helping faculty and staff identify effective methods for providing the research-based information which is the core of the land grant mission of transformational education that impacts individuals, communities, the environment and the quality of life of all.

3. A statement of how the input will be considered

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs

- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

Brief explanation.

NJAES truly values the input of our stakeholders. We have created welcoming environments where stakeholders feel comfortable and trust what is shared will be carefully considered and as policies are set, programs are developed, research direction is set and budget priorities are identified. Stakeholders are critical partners, and their input is necessary to ensure that the work we engage in is relevant and responsive.

The Research and Extension Committees of the NJAES Board of Managers are stakeholders who are actively engaged in the process of providing input on an ongoing basis throughout the year. They attend regular meetings with the Extension and Research Directors to share their knowledge of their local county or special interest areas they represent. They are true representatives of the diversity of research and extension that NJAES extends to the residents of NJ and beyond. Not only do they provide invaluable feedback on issues they also function in supportive roles as advocates for our research initiatives and extension educational outreach.

Brief Explanation of what you learned from your Stakeholders

Stakeholders were very vocal about the need to fill porduction agriculture vacancies.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
2464020	0	3120059	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	2931937	0	3760735	0
Actual Matching	13313972	0	11530818	0
Actual All Other	2334009	0	9022300	0
Total Actual Expended	18579918	0	24313853	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	0	0	0	0

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Climate Change - Water Quality & Quantity

☑ 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
102	Soil, Plant, Water, Nutrient Relationships	10%		10%	
111	Conservation and Efficient Use of Water	20%		20%	
112	Watershed Protection and Management	40%		40%	
133	Pollution Prevention and Mitigation	20%		20%	
605	Natural Resource and Environmental Economics	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	4.0	0.0
Actual Paid Professional	10.6	0.0	3.0	0.0
Actual Volunteer	822.0	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
188385	0	225494	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
953146	0	835184	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
105132	0	263915	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

• Work with municipalities to help them meet their regulatory responsibilities on stormwater management and watershed restoration
• Perform experiments to investigate what the current nutrient loads are in NJ water
• Determine the best methodologies for developing Total Maximum Daily Load (TMDL) values for NJ waterways
• Examine the effectiveness of alternative onsite wastewater treatment systems
• Provide scientifically sound advice to state regulatory bodies on water quality issues
• Math modeling of contamination transport in surface and groundwaters
• Create a program comprising of faculty, staff, volunteers, industry partners and government officials

2. Brief description of the target audience

• Municipalities
• State Department of Environmental Protection
• Staff and students who gain valuable scientific experience
• Industry partners who learn ways to meet water quality standards
• Communities who learn watershed restoration methods
• NJAES Faculty and Staff involved in water research/outreach
• School age youth
• Residents

3. How was eXtension used?

Rutgers Cooperative Extension faculty utilized .the eXtension water conservation CoP.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	19993	8940	1200	3371

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	20	20

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications,and publications.In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected.

Year	Actual
2013	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Short term - Knowledge of nutrient loads in various NJ waterways. Find the best methodologies for determining TDMLs
2	Medium term - To identify representative pollutants and aquifer systems in New Jersey. To develop equilibrium isotherms to quantify the adsorption/desorption kinetics for the pollutant/soil/water systems. To develop breakthrough and leaching data for the pollutant/soil/water systems.
3	Long Term - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.
4	Long Term - Water Chestnut Extension Program - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.
5	Long Term - Water Quality in Nursery Production - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.
6	Long Term - Community Based Stormwater Education, Detention Basin Management, Maintenance and Watershed Restoration for Health Ecosystems - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.
7	Long Term - Green Infrastructure for Municipal Officials - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.
8	Long Term - Stormwater Management in Your Backyard: ?Build a Rain Barrel? Workshops - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.

Outcome #1

1. Outcome Measures

Short term - Knowledge of nutrient loads in various NJ waterways. Find the best methodologies for determining TDMLs

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Medium term - To identify representative pollutants and aquifer systems in New Jersey. To develop equilibrium isotherms to quantify the adsorption/desorption kinetics for the pollutant/soil/water systems. To develop breakthrough and leaching data for the pollutant/soil/water systems.

2. Associated Institution Types

- 1862 Extension
- 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)
Sustainable Residential Landscapes in Salem and Cumberland Counties

Local landscapes include a mix of agricultural, urban, and suburban land uses. Therefore, a diversity of water users and a variety of non-point source pollutants to local waters. Several lakes and streams in the area have been designated as impacted by state regulators, and two watersheds are considered priority watersheds for restoration by the state of New Jersey. Addressing these concerns necessitates education of clientele groups not traditionally possessing a high degree of expertise in land management including homeowners and municipalities. Conserving potable water and preventing water pollution are essential to preserving agricultural productivity, and hence food security, as well as preserving water resources for drinking water, business use, recreation, and wildlife.

What has been done
In 2013 the Salem and Cumberland Counties Environmental and Resource Management Agents held three short workshops covering the topics of environmentally-friendly lawn care, soil quality

and runoff, and pond maintenance for a healthy environment. A formal presentation on environmentally-friendly lawn care was delivered in a workshop hosted by the Upper Deerfield Environmental Commission. Informal discussions were made to the Cohansey Area Watershed Association and additional outreach efforts included newsletter articles, blog posts, and poster displays at local county fairs.

Results

In 2013, fifty people attended the sustainable residential workshops. Program evaluations from these workshops indicated a knowledge gain from participants, for example with self-reported understanding of topics from the soil quality and runoff class increasing from an overall average of 3.2 out of 5.0 to 4.4 out of 5.0. Likewise, self-reported knowledge in the pond maintenance class increasing from an overall average of 3.5 to 4.7. Changes in behaviors are reported as well. In the soil quality in runoff class, 100% of participants said they would test their soil and improve their soils for environmental quality, and 80% said they would use what they learned to educate others. The work with the local watershed association is expected to have lasting results. Board members were educated on water pollution issues specific to their watershed. This science-based education is critical for the capacity-building of groups such as these that conduct wide-ranging education and outreach activities in the watershed, and ultimately reach a variety of members of the community.

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
133	Pollution Prevention and Mitigation
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

Long Term - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.

2. Associated Institution Types

- 1862 Extension
- 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)
Earth-wise Lawn and Landscape Care

Unnecessary or excessive inputs to landscapes such as pesticides, fertilizers, or water use, and irrigation applications will have a negative impact on the environment.

What has been done
Middlesex County Agricultural Agent developed a three hour comprehensive class, which covers the proper selection and care of landscape plants in order to keep plants healthy and reduce the need for unnecessary pesticide, fertilizer and irrigation applications. The presentation references current research on the selection, care and maintenance of landscape plants and covers applied, renovation and pruning techniques that can help to maintain plant vigor. The presentation provides details on how to replace the majority of pesticide use with proven best management practices and biological or alternative control methods for insects, disease and weed pests. The presentation and interactive discussion with students ends with a commitment from students to make behavioral changes to enhance their stewardship and protection of the environment.

Results
A total of 280 students received training in 12 classes throughout the state in 2013. Surveys indicate a total of 70 acres of lawns and landscapes were managed by students in the program. 75% of total students of the Nitrogen Fertilizer Reduction session committed to recycling grass clippings back to 70 acres. This would reduce the need for 1 pound of fertilizer application per lawn or 1 pound of actual nitrogen per 1,000 square feet for a reduction of 2,200 pounds of Nitrogen total. Based on the energy needed to produce Nitrogen fertilizer per pounds, this results in a savings of 75 million BTU's of energy or a reduction of equivalent #2 fuel oil diesel equivalent of 520 gallons. 75% of students reported that they would now irrigate in early morning and only as needed for a reduction on 1 acre inch of water per week on 70 acres. If we estimate one less irrigation per week at 1 inch per acre during the months of July and August then we could reduce 2 ½ million gallons per irrigation or over 20 million gallons for 8 applications during July and August. 80% of participants in the Solid Waste Reduction session committed to recycling grass clippings on 70 acres of lawn and landscape. Based on an average of 75 lbs of grass clippings generated by an average 5,000 square feet lawn, participants will reduce 40,000 pounds of grass clippings or 20 tons. This could result in a savings in landfill tipping fees of over $2,500.

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
133	Pollution Prevention and Mitigation
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

Long Term - Water Chestnut Extension Program - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.

2. Associated Institution Types

- 1862 Extension
- 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)
Water Chestnut Extension Program

Water chestnut is a highly aggressive aquatic invasive species that is causing a loss of income, recreation and real estate value to stakeholders in the Lake Musconetcong area. The Lake Musconetcong Regional Planning Board estimates the impacts from Water chestnut at $2.5 million dollars.

What has been done
The Water chestnut program has two distinct components: a Volunteer Hand Pulling Program and a Seed Research Component. The Hand Pulling was developed upon request by the Lake Musconetcong Board and the Hopatcong State Park to assist with the planning and coordination in order to increase the efficacy of the hand pulling operations. The Research component was a response to the Lake Musconetcong Regional Planning Board?s multi-pronged effort to control water chestnut; including mechanical harvesting, herbicide application and hand pulls. A Fact Sheet was developed; assistance in volunteer coordination was achieved with the Americorps Ambassador Program; greater planning was involved utilizing the Fact Sheet; and a target area was determined that complimented both the mechanical and herbicide treatments while allowing for a discrete section to be pulled that would leave both the volunteers and the residents with a sense of accomplishment after the Hand Pull.

Results
The Water chestnut program has two distinct components: a Volunteer Hand Pulling Program and a Seed Research Component. The Hand Pulling was developed upon request by the Lake Musconetcong Board and the Hopatcong State Park to assist with the planning and coordination

in order to increase the efficacy of the hand pulling operations. The Research component was a response to the Lake Musconetcong Regional Planning Board?s multi-pronged effort to control water chestnut; including mechanical harvesting, herbicide application and hand pulls. A Fact Sheet was developed; assistance in volunteer coordination was achieved with the Americorps Ambassador Program; greater planning was involved utilizing the Fact Sheet; and a target area was determined that complimented both the mechanical and herbicide treatments while allowing for a discrete section to be pulled that would leave both the volunteers and the residents with a sense of accomplishment after the Hand Pull.

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
133	Pollution Prevention and Mitigation
605	Natural Resource and Environmental Economics

Outcome #5

1. Outcome Measures

Long Term - Water Quality in Nursery Production - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.

2. Associated Institution Types

- 1862 Extension
- 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)
According to the USDA 2007 Agricultural Census, there were 183 nurseries located in Cumberland & Salem Counties. Cumberland County's 135 nurseries alone was the largest number of nurseries for any county in New Jersey and was the fifth largest acreage in the United States. Because of the diversity of plant material and various systems of production, growers constantly search for innovative methods of optimizing their production systems in a way that

maximizes output while minimizing environmental impact. Many nursery locations in both Cumberland and Salem Counties have nearby surface water areas. Protection of those areas is very important since nurseries require high quality quantities of water for production.

What has been done
A ?Topics in Nursery Production? educational meeting was held in 2013 focusing on water quality issues, presented by County Agricultural Agent, County Environmental Agent, Extension Specialist, NJAES Researchers and a local grower. The presentations included an introduction on water resources, an overview of remediation program support, information on water treatment, a discussion on engineering solutions, water quality enhancement practices, and a discussion on reducing the incidence of Phytophthora.

Results
As an outcome of the project, the grower who took the lead in requesting the project has now installed a tailwater recovery system that captures, with the exception of some storm water, 100% of the water moving across the nursery. That water is also recycled, reducing the need for groundwater removal by about 40%. Another nursery is completing a major project to recapture 100% of the excess irrigation water and recycle it, thereby reducing groundwater withdrawal needs by about 50%.

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
133	Pollution Prevention and Mitigation
605	Natural Resource and Environmental Economics

Outcome #6

1. Outcome Measures

Long Term - Community Based Stormwater Education, Detention Basin Management, Maintenance and Watershed Restoration for Health Ecosystems - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.

2. Associated Institution Types

- 1862 Extension
- 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)
Community Based Stormwater Education, Detention Basin Management, Maintenance and Watershed Restoration for Health Ecosystems

Due to the dense population and intense development within New Jersey, stakeholders face many problems with water quantity and quality issues as well as groundwater recharge.

What has been done
Community Based Stormwater Education and Outreach Program: Camden County Environment Resource Agent increased community outreach through training and joint efforts with Master Gardeners, Cooperative Extension 4-H volunteers, AmeriCorps Watershed Ambassadors and AmeriCorps Transitional Education and Employment Management Gateway Volunteers. Focusing on water reuse through rainwater harvesting, conducted 8 workshops, training 191 participants while constructing 180 rain barrels, conducted training on community bio retention projects, including rain gardens and native plant naturalization projects, 2 community rain gardens were installed. This combined rain garden area was calculated at intercepting, treating and infiltrating 102,000 gallons per year of rain water before it becomes runoff, recharging the groundwater supply and preventing polluted runoff. These five rain gardens will remove an average of 24.7 pounds of total suspended sediment (TSS), 0.26 pounds of phosphorous (TP), and 2.72 pounds of total nitrogen (TN) from the stormwater. Detention Basin Management, Maintenance and Enhancement Program: Educational programs regarding effective management, maintenance and enhancement programs of storm water basins in New Jersey were implemented, by modifying the basin allowing water to spread beyond the typical concrete low flow channel and planting deep-rooted herbaceous vegetation. Deep roots improve infiltration and filtration (pollutant removal) of stormwater runoff. In addition, such vegetation reduces mowing frequency to once per year. Finally, this vegetation provides habitat for desirable wildlife species and provides ecological benefits. To date four genera and six species of native pollinators have been identified foraging in the study area. Watershed Restoration for Healthy Ecosystems: Focuses on the basics of stream, lake and pond maintenance and repair with the emphasis on conditions encountered in the urban environment responding to upstream changes in hydrology, sediment, and pollutant transport.

Results
To date, of the survey responders, 82% have installed their rain barrels at home and 24 % have installed additional barrels; 94% reported no difficulty installing the rain barrel; 19% have implemented additional stormwater runoff conservation practices; and 59% have adopted additional water conservation mechanisms following the training. Input will also be used to structure future workshops. Detention Basin Management, Maintenance and Enhancement Program: Cherry Hill Public Works supervisor estimates that the five basins that have been naturalized in his area, has reduced maintenance costs by $20,000 annually. Based on the success of reduce maintenance within the stormwater basins, the DPW has started implementing "no-mow" zones on other Township properties. Watershed Restoration for Healthy Ecosystems: Use of the installed aeration system at Hopkins Pond, severely reduce the occurrence of

cyanobacteria blooms during the first summer of operation. Oxygen levels were within 0.25ppm from surface to bottom (14 feet deep), demonstrating that the system is circulating water properly. There was no fish kill during 2013 as occurred in previous years. This work received two awards for the project at Hopkins Pond: the NJ American Water Resources Association ?Excellence in Water Resources Protection and Planning Award?, and the ?Environmental Achievement Award? from the NJ Association of Environmental Commissions.

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
133	Pollution Prevention and Mitigation
605	Natural Resource and Environmental Economics

Outcome #7

1. Outcome Measures

Long Term - Green Infrastructure for Municipal Officials - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.

2. Associated Institution Types

- 1862 Extension
- 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)
Green Infrastructure for Municipal Officials

Many of New Jersey?s municipalities are highly urbanized with numerous stormwater and combined sewer issues. During wet weather, the system can become overwhelmed and the combined sewage and stormwater is often discharged untreated to a local waterbody. This event is called a combined sewer overflow and poses a risk to both human health and to the water quality of the receiving waterway.

What has been done

Green infrastructure is an approach to wet weather management that infiltrates, evapotranspires, captures and reuses stormwater to maintain or restore natural hydrologies within a watershed (www.epa.gov/greeninfrastructure). An Introduction to Green Infrastructure Practices fact sheet: was written to introduce the topic of green infrastructure to the general public. Stormwater Management Techniques for Runoff Reduction: 2-hour seminars with demonstrations of permeable pavement and rain gardens were presented to municipal engineers, officials, and other interested parties. Over 80 municipal, county, and state representatives attended this event. This program helped to establish a baseline for evaluating green infrastructure needs in New Jersey. Stormwater experts from the US EPA presented research and lessons learned from installation of green infrastructure stormwater management practices. New Jersey Green Infrastructure Survey: was sent to every municipality in New Jersey in order to create a baseline for what types of green infrastructure projects are in the ground and where they are being installed. Someone from 22% of New Jersey?s 565 towns responded and of those, 70% already had at least one green infrastructure installation in their town. New Jersey Green Infrastructure Forum: an 8-hour event brought together municipal, county, and government officials to discuss the state of green infrastructure in the state. There was time for discussion and next steps for how municipalities can implement green infrastructure in their towns.

Results

Surveys given to green infrastructure workshop attendees as an online follow-up (n = 51) showed that 83% of respondents would like to have more green infrastructure stormwater management practices installed in their town/county and 72% already had at least one installation in their area. Lack of funding (69%) and lack of education (76%) were the primary reasons that more systems had not been installed. These findings have led to changes in the program to include cost analyses, presentation of available state funding sources, and increased educational efforts.77% of participants responded that installation demonstrations would also be helpful. The City of Newark has installed a new 700 sq. ft. permeable pavement sidewalk installation (Goodwin Ave.). This installation will be able to intercept and infiltrate up to 7,800 gallons of runoff per storm event. The East Orange VA Hospital installed a new 1440 sq. ft. permeable pavement sidewalk installation. This installation will be able to intercept and infiltrate up to 16,150 gallons of runoff per storm event. Passaic County recently committed to a Green Streets Initiative that includes permeable pavement and is in the beginning stages of designing permeable pavement systems for 2 locations in Paterson.

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
133	Pollution Prevention and Mitigation
605	Natural Resource and Environmental Economics

Outcome #8

1. Outcome Measures

Long Term - Stormwater Management in Your Backyard: ?Build a Rain Barrel? Workshops - A safe and secure water supply for all communities and industries in the state. An effective and efficient nutrient-trading program that meets the needs of industry and meets the standards set by the state regulatory bodies.

2. Associated Institution Types

- 1862 Extension
- 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)
Stormwater Management in Your Backyard: ?Build a Rain Barrel? Workshops

As stormwater runoff flows over the land or impervious surfaces (paved streets, parking lots, and building rooftops), it accumulates debris, chemicals, sediment or other pollutants that can adversely affect water quality if the runoff is untreated.

What has been done
?Build a Rain Barrel? workshops, offered as part of the Stormwater Management in Your Backyard program, provide information on rain barrel construction and maintenance and include a hands-on training where attendees build a rain barrel for installation at their home or business. Between January 2013 and December 2013, twelve (12) ?Build a Rain Barrel? workshops were held with 394 people in attendance.

Results
394 rain barrels were built and installed, capturing approximately 1,379,000 gallons of stormwater annually.

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
133	Pollution Prevention and Mitigation
605	Natural Resource and Environmental Economics

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

External factors did not affect outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

NJAES research and extension outcomes related to this planned program were evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we included the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys were used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we focused on program delivery, participation, relevance and timeliness. Data was collected at appropriate times for each initiative that supports this planned program. IRB approved evaluation instruments were used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstration were collected and analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions. See state defined outcomes for detailed results of each initiative.

Key Items of Evaluation

None to report

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Childhood Obesity - Youth/Adult 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
701	Nutrient Composition of Food	10%		10%	
702	Requirements and Function of Nutrients and Other Food Components	10%		10%	
703	Nutrition Education and Behavior	25%		25%	
704	Nutrition and Hunger in the Population	15%		15%	
724	Healthy Lifestyle	40%		40%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	6.0	0.0	5.0	0.0
Actual Paid Professional	23.5	0.0	8.7	0.0
Actual Volunteer	196.0	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
500574	0	464801	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1562453	0	1922068	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
423518	0	2012067	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

• To identify the factors that promote excessive weight gain as well as protect against childhood obesity
• Measure how children born small for age are different with respect to body composition and risk for diabetes prior to developing diabetes or obesity.
• Investigate how perilipin A works in adipocytes to control fat storage and fat breakdown.
• Collect and analyze data on obesity-related measures (i.e., BMI) in adults and children
• Examine how weight loss affects calcium absorption and bone mass
• Create a multidisciplinary program comprising of faculty, staff, the medical community, industry partners and government officials
• Conduct adult/youth education and deliver targeted messages on healthy food choices and increased physical activity education using the following strategies:

Direct Methods:
• Educate Youth
• Educate Parents
• Educate Volunteers
• Food and Fitness Ambassadors
• Educate Child Health Summit Professionals
• Educate Teachers/School Nurses
• Educate Communities

Indirect Methods:
• Website
• Social Marketing

2. Brief description of the target audience

• Clinicians, Physicians and Nurses
• Health Care Professionals
• Hospitals (including teaching hospitals)
• Staff and students who gain valuable scientific experience
• Industry partners that benefit from fundamental and applied research in obesity and related chronic diseases
• Communities that benefit from increased knowledge about the mechanisms involved in obesity
• Other faculty and staff working on similar research
• Health-related organizations and foundations interested in obesity/nutrition issues
• School Age Youth
• Teens
• Teachers
• After School Providers
• Parents
• Volunteers
• Extension Professionals
• State and County Agencies and Organizations
• Schools

3. How was eXtension used?

RCE faculty used the following CoPs: Family Food and Fitness; Evaluation; Creating Healthy Communities; Healthy Food Choice in Schools;Community Nutririton Education; Diabetes and the Learning Network. Faculty answered ask the expert questions, developed collaborative educational products,conducted learn professional development sessions and provided leadership to CoPs.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	924	21206	5563	11924

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

Patent Applications Submitted

Year:	2013
Actual:	8

Patents listed
2013-035
2004-021
2006-088
2012-146
2004-021
2006-017
2006-033
2006-088

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	13	55	68

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications,publications. In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected

Year	Actual
2013	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Short Term - Individuals gain awareness, knowledge, skills related to: Attitudes about healthy eating for adults/youth. Healthy food choices for adults/youth. Selection of healthy foods for adults/youth. Benefits of physical activity (reduced overweight and obesity, reduced risk of diabetes, heart disease and cancer.) Physical activity recommendations for health for adults/youth. Identify factors that promote excessive weight gain and protect against childhood obesity. Understand the molecular mechanisms of lipid transport in the intestinal cell. Demonstrate the affects on calcium absorbtion and bone mass by weight loss
2	Medium Term - Individuals incorporate skills/change behaviors related to: Increased adoption of healthy food practices. Increased consumption of fruits, vegetables, whole grains and low-fat dairy. Increased participation in family meals. Increased participation in physical activity. Increased participation in family-related physical activity. Increased use of new 'campaign' website. Improved understanding of the relationship between early nutrition and later risk for chronic disease. Understanding the process by which perilipins at the surface of lipid droplets control how much energy is released from the adipocyte at times of need. Understanding how the intestines and body uptake and process dairy fat. Identify genes, their protein product and how the proteins influence the way the body processes fat.
3	Long Term - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.
4	Medium Term - Working Well in NJ, Worksite Wellness Toolkit - Individuals incorporate skills/change behaviors related to: Increased adoption of healthy food practices. Increased consumption of fruits, vegetables, whole grains and low-fat dairy. Increased participation in family meals. Increased participation in physical activity. Increased participation in family-related physical activity. Increased use of new 'campaign' website. Improved understanding of the relationship between early nutrition and later risk for chronic disease. Understanding the process by which perilipins at the surface of lipid droplets control how much energy is released from the adipocyte at times of need. Understanding how the intestines and body uptake and process dairy fat. Identify genes, their protein product and how the proteins influence the way the body processes fat.
5	Long Term - Get Moving-Get Healthy with NJ 4-H Program - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.
6	Long Term - Building Collaborations and Distributing Fresh Produce to Seniors and Urban Residents at the Farmer?s Market Union County, NJ - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

7	Long Term - Grow Healthy School Wellness Initiative - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.
8	Long Term - Flemington-Raritan School District- School Wellness Environment Assessment and Improvement - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.
9	Long Term - Small Steps to Health and Wealth - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.
10	Long Term - Evaluation and Characterization of Novel Botanical Extracts for the Prevention and Treatment of Metabolic Syndrome and Diabetes - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.
11	Long Term - Introducing New Crops, Nutraceuticals and other Value-Added Products - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.
12	Long Term - Health Finance Education - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

Outcome #1

1. Outcome Measures

Short Term - Individuals gain awareness, knowledge, skills related to: Attitudes about healthy eating for adults/youth. Healthy food choices for adults/youth. Selection of healthy foods for adults/youth. Benefits of physical activity (reduced overweight and obesity, reduced risk of diabetes, heart disease and cancer.) Physical activity recommendations for health for adults/youth. Identify factors that promote excessive weight gain and protect against childhood obesity. Understand the molecular mechanisms of lipid transport in the intestinal cell. Demonstrate the affects on calcium absorbtion and bone mass by weight loss

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Medium Term - Individuals incorporate skills/change behaviors related to: Increased adoption of healthy food practices. Increased consumption of fruits, vegetables, whole grains and low-fat dairy. Increased participation in family meals. Increased participation in physical activity. Increased participation in family-related physical activity. Increased use of new 'campaign' website. Improved understanding of the relationship between early nutrition and later risk for chronic disease. Understanding the process by which perilipins at the surface of lipid droplets control how much energy is released from the adipocyte at times of need. Understanding how the intestines and body uptake and process dairy fat. Identify genes, their protein product and how the proteins influence the way the body processes fat.

2. Associated Institution Types

- 1862 Extension
- 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)
Grow Healthy ? Team Nutrition ? Statewide School Food Service Training

Obesity prevention and improving the health of youth and adults is a national priority. Changes to the national school lunch program have also brought healthy eating to the forefront of attention. Youth and adults need education and help make behavior changes for themselves, their families, schools and communities to improve health.

What has been done
Statewide School Food Service Training for Smarter Lunchrooms for the New Jersey School Nutrition Association at their Annual Conference on August 14, 2013. Reached about 200 professionals.

Results
School Food Service Training ? reported,
?I learned??

-Techniques to "nudge" students to make healthier food choices
-Techniques to increase sales of healthier foods
Best practices you plan to try at school this fall
-Fruit ideas: fruit next to checkout, serving more fresh fruits, asking ?would you like an apple with that??
-Entrée ideas: moving target entrée to first spot, clever names
-Vegetable ideas: clever names, talking it up, having 2 or more choices
-Reimbursable meals ideas: charge cash for dessert and snacks, grab & go meals
-Dairy ideas: move white milk to front of case

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #3

1. Outcome Measures

Long Term - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

2. Associated Institution Types

- 1862 Extension
- 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)
Get Moving Get Healthy NJ Workforce Program

Health benefits are rising quickly in the US due to the increased risk of diabetes, heart disease, high blood pressure, and other chronic disease. New Jersey Counties are challenged with managing increased health benefits for their employees.

What has been done

Get Moving Get Healthy NJ Workforce was created as a means of engaging County employees in a walking program that takes existing knowledge of healthy lifestyle and physical activity and improves the retention of learning after the event. The program was offered in Somerset, Warren, Ocean and Union Counties, as well as to 8 NJ employers around the state. The goal is for employees to live longer, healthier lives by: increasing awareness of the importance of sustaining good health with proper nutrition and physical activity; increasing awareness of the importance of physical activity as a component of healthy lifestyle; and increasing awareness of the effect of healthy eating habits, physical activity and stress reduction.

Results

Follow-up survey taken by 117 employees. Results to date are as follows: Increased knowledge of Body Mass Index: 53% increased knowledge of Body Mass Index, 31% reported a Body mass Index of 26 or higher after the weekly focus lesson. Increased the number of steps taken per day: 80% increased their knowledge of the number of steps taken per day, 4% increased their steps to the recommended 10,000 steps per day. 52% improved physical condition, 62% lost some body weight, 42% lost some inches around the body, 36% improved physical appearance, 53% fit better in clothing, 33% improved level of energy, 26% improved sleep, 55% improved diet, 63% increased consumption of fruit, 62% increased consumption of vegetables, 20% decreased level of stress, 40% increased level of exercise.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #4

1. Outcome Measures

Medium Term - Working Well in NJ, Worksite Wellness Toolkit - Individuals incorporate skills/change behaviors related to: Increased adoption of healthy food practices. Increased consumption of fruits, vegetables, whole grains and low-fat dairy. Increased participation in family meals. Increased participation in physical activity. Increased participation in family-related physical activity. Increased use of new 'campaign' website. Improved understanding of the relationship between early nutrition and later risk for chronic disease. Understanding the process by which perilipins at the surface of lipid droplets control how much energy is released from the adipocyte at times of need. Understanding how the intestines and body uptake and process dairy fat. Identify genes, their protein product and how the proteins influence the way the body processes fat.

2. Associated Institution Types

- 1862 Extension
- 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)
Working Well in NJ, Worksite Wellness Toolkit

The cost of health benefits are rising quickly in the US due to the increased risk of diabetes, heart disease, high blood pressure and other chronic diseases.

What has been done
With the assistance of the Employers Association of NJ, 24 worksites were identified to participate in the pilot of the toolkit, developed by Educators within the Department of Family and Community Health Sciences. Technical assistance was provided for the employers by means of: 3 Face-to-face meetings, 24 online webinars, 2 telephone calls or more per employer, and monthly email messages linking to resources to create a culture of wellness in their worksite. Twenty-four employers, representing a potential 10,000+ employees in 20 NJ counties. 2,951 employees completed the Employee Baseline Behavior & Interest Survey: 85% of the respondents reported their job as mostly sitting/standing, 10% mostly walking, 5% mostly heavy labor or physically demanding work.

Results
2,951 employees completed the Employee Baseline Behavior & Interest Survey: 50% reported feeling stress 3 or more days per week; 26% met the physical activity recommendations of the CDC; 4% consumed the recommended amount of fruit per day; 7% consumed the recommended amount of vegetables per day; 15% smoke cigarettes; 79% are interested in learning about healthy food choices; 85% would like the availability of healthy snacks on the job (vending machine choices); 85% want to increase their level of physical activity; 82% want information about stress management; 21% want information about tobacco use; 17% want smoking cessation sessions; 44% want wellness information via email messages; 22% want wellness information via online newsletter; 11% want information via hardcopy newsletter; and 18% want lunch and learn sessions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components

703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #5

1. Outcome Measures

Long Term - Get Moving-Get Healthy with NJ 4-H Program - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

2. Associated Institution Types

- 1862 Extension
- 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)
Get Moving-Get Healthy with NJ 4-H Program

Research shows that children and families have increased their consumption of sugary drinks, eat larger portion sizes, and spend more time in front of a screen than outdoors. As a result, there has been a decrease in healthy eating, physical activity, and family meals.

What has been done
The Get Moving-Get Healthy (GMGH) with New Jersey 4-H program is an interactive and fun way to learn healthy eating habits, portion sizes, USDA?s new Choose My Plate, and simple exercises. The program focuses on understanding Choose My Plate, identifying portion sizes, and learning easy ways to exercise. A key component of the program are the hands-on activities including: Exercise Challenge, Choose My Plate, Measure Up, Portion Distortion, Read the Label, Serving Match, Think What You Drink, Food Groups, and What Counts.

Results
Post-tests show that as a result of the Get Moving-Get Healthy with New Jersey 4-H program: 96% of participants feel they understand the importance of proper nutrition and physical activity,

90% of participants feel they now are prepared to make healthy eating and physical activity a part of their daily lives, 85% of participants noted they will reduce their consumption of sugar sweetened beverages, 81% of participants noted they now know how to build a healthy plate and the correct portion sizes for each meal.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #6

1. Outcome Measures

Long Term - Building Collaborations and Distributing Fresh Produce to Seniors and Urban Residents at the Farmer?s Market Union County, NJ - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

2. Associated Institution Types

- 1862 Extension
- 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)
Building Collaborations and Distributing Fresh Produce to Seniors and Urban Residents at the Farmer?s Market Union County, NJ

Food security and access to fresh fruits and vegetables is a challenge for urban residents and seniors.

What has been done
Union County Freeholders, NJ Dept. of Agriculture and the Senior Meals Coordinator along with Rutgers Cooperative Extension FCHS Educator, SNAP-Ed Supervisor and Staff, Ag agent, Master Gardeners in Elizabeth, Plainfield, Roselle, Rahway, along with WIC in Elizabeth and Plainfield supported bringing Fresh Produce to Farmers Markets at various sites in Union county fostering a collaborative effort of Rutgers Cooperative Extension, county and city agencies with NJ farmers. To provide nutrition education and distribution of vouchers for free produce at the participating markets.

Results
Vouchers ($ 20) for free produce for seniors were distributed in Union County. Three farmers visited 9 towns to deliver produce to Union County senior residents. Nutrition education was provided by SNAP-Ed at the sites and SNAP-Ed assists with distributing vouchers with Union County Division on Aging Staff. In FY 2013?Eighteen thousand $ 5.00 vouchers worth $ 90,000 were given to eligible seniors in Union County to purchase Jersey Fresh fruits and vegetables as part of the WIC Senior Farmers Market program. Seniors get a maximum of 4 vouchers @ $ 5.00 each or a total of $ 20 per senior. Transportation to the farmer?s markets is provided by county paratransit system.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #7

1. Outcome Measures

Long Term - Grow Healthy School Wellness Initiative - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

2. Associated Institution Types

- 1862 Extension
- 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)
Grow Healthy School Wellness Initiative

Childhood obesity continues to be a concern in America, with roughly 17% of children and adolescents aged 2-19 classified as obese. Health experts continue to emphasize the impatience of making changes to policy and the environment affecting children and families to promote healthy lifestyles.

What has been done
2,270 students participate in food, nutrition and edible garden programming, including vegetable taste-testing?s to identify new vegetable options to achieve USDA vegetable subgroup requirements in school cafeterias. ~150 school nutrition professionals participated in two in-person workshops. 21 volunteers were trained to teach supplementary food/nutrition lessons in schools, serve on school wellness councils, and provide support to school wellness activities throughout the school year. 58 students at 2 schools joined Youth Advisory Councils to conduct a wellness assessment via the Students Taking Charge assessment and develop plans to address identified needs in areas of nutrition & physical activity. 52 teachers, nurses and administrators participated in professional development workshops to complete the CDC School Health Index (SHI) assessment tool to develop school wellness plans, and identify strategies to enhance nutrition and physical activity in their schools.

Results
Follow-up surveys and outreach indicate a number of changes have resulted: New vegetables have been added to school lunch menus, based on results of student taste-testing?s, enabling school nutrition professionals to increase the variety of vegetables served and better meet USDA vegetable subgroup requirements. Schools developed SHI assessments and developed wellness implementation plans and strategies. YACs developed youth-led projects to increase physical activity during indoor recess. YACs developed youth-led projects to increase healthy offers in the cafeteria. FCHS Wellness Champions are teaching nutrition lessons in elementary school classrooms, leading after-school food & garden clubs and supporting school garden and wellness council projects.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #8

1. Outcome Measures

Long Term - Flemington-Raritan School District- School Wellness Environment Assessment and Improvement - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

2. Associated Institution Types

- 1862 Extension
- 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)
Flemington-Raritan School District- School Wellness Environment Assessment and Improvement

Childhood obesity continues to be a concern in America, with roughly 17% of children and adolescents aged 2-19 classified as obese. Health experts continue to emphasize the importance of making changes to policy and the environment affecting children and families to promote healthy lifestyles. Providing a healthy school environment is a key strategy, one which emphasizes provision of healthy foods served/sold on campus, adequate physical activity, role modeling of healthy behaviors by school adults, and parent involvement in school health.

What has been done
As part of a comprehensive and ongoing school wellness partnership between FCHS and the Flemington-Raritan School District (serving approximately 3,400 Pre-K through 8th Grade students) training and mentorship was provided to the District Wellness Council on conducting the Center for Disease Control?s School Health Index (SHI) Assessment, an evidenced-based tool which evaluates areas of strength and weakness in the overall school wellness environment. The assessment was completed in November of 2013. Teams of 4-5 participants were assembled around each SHI topic area, and utilizing the SHI discussion questions, each area of school health was scored. Once the assessment was complete, preliminary action items were identified for development of improvement strategies. Follow-up included formation of school-level wellness teams to further refine/implement the strategies.

Results

As a result of the SHI Assessment, a formal process for making changes to the school wellness environment was established. The process fostered dialog with school administrators and has led to action planning in the following areas identified as in need of improvement: School Nutrition Services-investigation of improvements to competitive foods and school meal menu choices; investigation of improved School Food Service contract specifications; input from parents on school nutrition issues. Health Promotion for Staff-identification and linking of community resources to fill staff wellness gaps, via Hunterdon County Partnership for Health and other resources. Family and Community Involvement-Promulgation of results of a Parent and Student School Foods Survey to address school foods concerns; empowerment of parents to provide input to School Board on school wellness issues.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #9

1. Outcome Measures

Long Term - Small Steps to Health and Wealth - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

2. Associated Institution Types

- 1862 Extension
- 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)
Small Steps to Health and Wealth

Many Americans have health and personal finance ?issues.? Major societal problems that have been widely reported in recent years include an increasing incidence of diabetes, more overweight and obese adults and children, low household savings rates, and high household debt and bankruptcy rates. There are also many ways that health affects personal finances (e.g., the high cost of unhealthy habits (e.g., smoking) and medical expenses) and personal finances affect health (e.g., physical symptoms and poor health care associated with financial distress). A need exists to teach consumers about health finance topics (e.g., health insurance, long-term care, the financial cost of unhealthy behaviors) and behavior change strategies that can be simultaneously applied to improve health and increase wealth.

What has been done
RCE Extension Specialist provides national leadership to Small Steps to Health and Wealth (SSHW), a national Cooperative Extension program that integrates health and personal finance subject matter and encourages participants to simultaneously improve both aspects of their lives. Research-based program outputs during the past year include new archived monthly health and financial messages on the SSHW Web site, http://njaes.rutgers.edu/sshw/, completion of the second edition of the Small Steps to Health and Wealth workbook in April 2013 (see the PALS Publishing Web site at Cornell University for details: http://palspublishing.cals.cornell.edu/nra_order.taf?_function=detail&pr_id=159&_UserReference=390EA92CF91370F352AF368A), and two online SSHW Challenges which tracked participants' performance of ten recommended practices on a daily basis, five related to health/nutrition and five related to personal finance.

Results
Follow-up research using an online survey was conducted. Survey findings indicated that the online SSHW challenge fostered several positive behavior changes with the following results reported by 30 participants in the two challenges: Eat healthier foods (74% Winter Challenge, 100% Spring Challenge), Increased daily physical activity (57%, 86%), Improved spending habits (30%, 57%), Lost weight (30%, 29%), and Saved money (43%, 71%). In the January-February Challenge, 25% saved up to $300, 25% saved $301 to $400, and 50% saved $501 or more. In the April-May 2013 Challenge, 25% saved up to 300, 25% saved $301 to $400, and 50% saved $501 or more. Over 70% of respondents to the follow-up evaluation surveys for the two Challenges rated them as "very positive and motivational." Independent third-party research of the New York Public Library, using the Critical Incident Technique, produced noteworthy findings. Respondents recalled 41 successful critical incidents, which were sorted into categories also found in the Pre-training Survey. Post-training results saw an increase in Enable Patron to Solve Problem (from 7% Pre-training, to 15% Post-training) and a decrease in Provided Referral (from 20% Pre-training, to 4% Post-training). These results suggest that staff are working more closely with patrons to solve problems, and are better prepared to do so more frequently without referrals, a very positive result.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior

704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #10

1. Outcome Measures

Long Term - Evaluation and Characterization of Novel Botanical Extracts for the Prevention and Treatment of Metabolic Syndrome and Diabetes - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

2. Associated Institution Types

- 1862 Extension
- 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)
Evaluation and Characterization of Novel Botanical Extracts for the Prevention and Treatment of Metabolic Syndrome and Diabetes

The occurrence of type 2 diabetes continues to soar to epidemic proportions reaching almost 8% (23.6 million) of the population in the U.S. alone. Another 57 million Americans have prediabetes, defined by an impaired fasting glucose values as a result of insulin resistance.

What has been done
NJAES research is an extension of the work completed under the project entitled "Mechanisms of Phytochemical Elicitation with Acetate - a New Window into Inducible Biochemical Pathways". The research focuses on botanicals that can be used for the prevention/treatment of metabolic syndrome, defined as a condition whose major features consist of obesity, development of Type 2 diabetes and accelerated cardiovascular disease, and how the constituents of botanicals affect insulin signaling pathways and improve insulin resistance, the underlying metabolic dysregulation associated with metabolic syndrome.

Results

Our research findings indicate that specific food formulations of Artemisia polyphenols exhibit improved bioaaccessibility, bioavailability and bioactivity. More specifically, these studies examined how the active compounds from plants can be formulated with a food component such as soy protein to significantly improve the parameters related to the overall effectiveness of the botanicals in future clinical work. These efforts provide significant benefits to the biotechnology and pharmaceutical industries in the State and contribute to value added agriculture of New Jersey.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #11

1. Outcome Measures

Long Term - Introducing New Crops, Nutraceuticals and other Value-Added Products - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

2. Associated Institution Types

- 1862 Extension
- 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)
Introducing New Crops, Nutraceuticals and other Value-Added Products

In the 21st century, success in commercial farming in the East will depend largely on the ability of

the growers to focus on high value, specialty crops such as ethnic produce targeted at specific niche markets for favorable competitive advantages as does the rise in interest of locally grown produce and leaving a greener footprint with lowered transportation costs. Economic opportunities have arisen in the last decade for specialty crop agriculture catering to the ethnically diverse consumers along the eastern coast of the United States.

What has been done

NJAES Researchers conducted work to understand the ethnic crops and herbs in market demand and develop new crops for Jersey agriculture, and to identify new uses and applications of plants, with a focus on fruits and vegetables and herbs. This program seeks to bring together the scientific disciplines ranging from genetics and plant variety development, through production and processing, product standardization, and to identify new bioactive compounds in the plants and foodstuffs that are of potential health and/or commercial interest. Most of the ethnic greens and herbs reviewed can be grown in production systems similar to those used to grow traditional American crops. This project also seeks to identify those crops which can be developed as nutraceuticals. Thus, the chemical profiling of a selected range of fruits, vegetables, herbs and botanicals will be extensively studied. These extracts will be assessed as dietary supplements and disease prevention agents. New products will be developed, the processing and extraction of the value-added products will be determined, and private sector partnerships will be sought to achieve fast track commercialization.

Results

Results of this work included germplasm collection and study of plant diversity, several new crops and plant species were greenhouse and field evaluated for their production, yield and adaptability, as well as nutritional quality. Progress was accomplished in the design and improvement of several culinary herbs and aromatic plants in biomass production, higher yield of essential oils, disease resistance and the identification of several compounds in these plants that are responsible for the species medicinal activity. Studies in quality control of dietary supplements and nutraceuticals showed that many commercial products now in the US marketplace do not meet their own label claim, as well as were found to contain adulterants. International projects in new crop development and the use of agriculture and horticultural production to provide income generating activities and food security have continued to use our market-first scientific-driven models with success in several regions in sub-Sahara Africa. The linkages between agriculture and human health and nutrition continue to be featured in evaluations with ethnic vegetables, greens and herbs and indigenous plants in developing countries. The quality control systems put in place and used have allowed commercial growers in the USA and abroad to produce and market improved higher quality products which have facilitated market demand and sales/trade.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #12

1. Outcome Measures

Long Term - Health Finance Education - Individuals experience: Decreased overweight and obesity for youth/adults. Decreased risk factors for nutrition-related health problems and chronic diseases that are affected by diet and physical activity for youth/adults. A clear and comprehensive understanding of the genetic and physiological mechanisms of obesity and related chronic diseases. Pharmacological and/or medical treatments to alleviate the effects of obesity and related diseases.

2. Associated Institution Types

- 1862 Extension
- 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)
Health Finance Education

With passage of the 2010 health care law and high unemployment rates during 2013, much attention was paid to health and personal finances and relationships between both aspects of people?s lives. A need exists to teach consumers about health finance topics (e.g., health insurance, long-term care, financial cost of unhealthy behaviors) and behavior change strategies that can be simultaneously applied to improve health and increase wealth. In addition, the implementation of the Affordable Care Act (ACT) in October 2013 prompted increased public interest in the issue of health insurance literacy as well as understanding the nuances of the ACA.

What has been done
The RCE Extension Specialist delivered the following health finance education programs to New Jersey residents: Wrote monthly Small Steps to Health and Wealth? (SSHW) financial messages that are archived at http://njaes.rutgers.edu/sshw. Added and updated health finance content on the RCE Financial Aspects of Health Web site: http://njaes.rutgers.edu/healthfinance/ (e.g., current annual limits for Health Savings Accounts). Served on the advisory committee of the state Senior Medicare Patrol (SMP) program. SMP addresses issues related to Medicare fraud and committee membership provides opportunities for networking with health-related government and human services agencies. Created a series of ten SSHW animated videos with speaking avatars that discuss key health and financial behavior change strategies. The videos are available at: http://www.youtube.com/user/moneytalkBMO. Successfully completed the Certified Application

Counselor (CAC) certification program from the Centers for Medicare & Medicaid Services (CMS) to become more familiar with the process of enrolling people in a health insurance plan in a government-facilitated health insurance exchange and to better understand the nuances of the Affordable Care Act (ACA).

Results

The Winter and Spring 2013 challenges resulted in many positive changes. Well over half of the follow-up evaluation respondents in both challenges reported eating healthier foods and increased physical activity. In the Spring 2013 challenge, all respondents reported healthier eating. In addition, over a quarter of respondents in the Winter challenges and over a half of the respondents in the Spring challenge reported improved spending habits. Over a quarter of the evaluation respondents also reported losing weight and saving money. Forty percent or more of respondents in both challenges saved over $500 and 100% lost between one and ten pounds. For both health and financial practices, these initial reported behaviors have the potential for significant impact over time.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

NJAES research and extension outcomes related to this planned program were evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we included the measurement of knowledge gained as measured by pre/post

Likert-scale assessments. Surveys were used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we focused on program delivery, participation, relevance and timeliness. Data was collected at appropriate times for each initiative that supports this planned program. IRB approved evaluation instruments were used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstration were collected and analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions. See state defined outcomes for detailed results of each initiative.

Key Items of Evaluation

No items to report.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

4-H Youth Development

☑ 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%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	30.0	0.0	1.0	0.0
Actual Paid Professional	32.1	0.0	0.0	0.0
Actual Volunteer	2754.0	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
389053	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1645316	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
623634	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Positive Youth Development:

• Employ Essential Elements (belonging, independence, mastery and generosity) as the basis for life skill development and related workforce development skills.

- Utilize Experiential Education Model (Experience, Share, Process, Generalize, Apply).

Provide opportunities for youth to:
- Feel and believe that they are cared about by others (Attachment, Belonging, Connection)
- Feel and believe they are capable and successful (Achievement, Mastery, Competence)
- Know they are able to influence people and events (Autonomy, Power, Confidence)
- Practice helping others through youth's own generosity (Altruism, Purpose, Contribution)

Subject matter:
(USDA/NIFA Mission Mandates)
Science, Engineering, Technology (includes:science literacy, animal science, plant science, environmental science, life sciences, etc) Citizenship (includes youth engagement, community youth development, community service, character development, civic engagement, etc) Healthy Lifestyles (includes chemical health, mental and emotional health, foods & nutrition, physical health and safety, etc).

2. Brief description of the target audience

- School Age Youth (K - 13, one year out of high school) and their Parents
- 4-H Volunteers (adult and youth)
- Teachers/Educators/other Youth Development Educators
- School Age Child Care Providers
- College Students (interns, collegiate 4-H)
- Other Extension Professionals and University Partners
- Communities: Stakeholders and Non-Profit, Social Service, Government Agencies
- Under-served and Under-represented Audiences

Delivery modes:

- 4-H Clubs and Related Activities
- 4-H Afterschool (clubs and short-term programs)
- 4-H School Enrichment
- 4-H Special Interest
- 4-H Camping (day camps and overnight camping)
- 4-H Mentoring and Individual Study

3. How was eXtension used?

Faculty and staff participated in the Military Families Learning Network. They answered ask the expert questions, developed collaborative educational products, and conducted learn professional development sessions.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	71190	733123	94016	537463

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	5	0	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications,and publications.In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected.

Year	Actual
2013	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Short Term - Youth increase awareness, knowledge, attitudes, and skills related to essential elements, workforce development, life skill development, and relevant subject matter. Volunteers increase knowledge and awareness of practices fostering positive youth development, including youth/adult partnerships. Youth development professionals and stakeholders increase awareness and knowledge of problems and solutions supporting positive youth development, including: policies that need to be addressed,community resources and support.
2	Medium Term - Youth apply knowledge, attitudes, skills, and behaviors needed to become competent, caring and contributing citizens by: taking on leadership roles in their youth organizations and schools, and working in partnership with adults in a variety of settings. Youth and adults demonstrate effective partnerships through increased youth participation on advisory committees and other governing bodies. Volunteers and youth development professionals apply practices fostering positive youth development.
3	Long Term - Youth demonstrate mastery and competencies needed to become engaged by assuming leadership positions in communities; developing and implementing action plans to address community needs, and becoming productive members of the workforce. 4-H youth are engaged partners in decision making regarding RCE programming including but not limited to 4-H youth development programming. 4-H alumni and volunteers become engaged citizens by assuming leadership positions in communities. Youth development professionals and stakeholders influence decision makers in policy development related to youth development needs and issues.
4	Medium Term - 4-H North Jersey Teen Conference - Youth apply knowledge, attitudes, skills, and behaviors needed to become competent, caring and contributing citizens by: taking on leadership roles in their youth organizations and schools, and working in partnership with adults in a variety of settings. Youth and adults demonstrate effective partnerships through increased youth participation on advisory committees and other governing bodies. Volunteers and youth development professionals apply practices fostering positive youth development.
5	Medium Term - New Jersey 4-H Horse Program - Youth apply knowledge, attitudes, skills, and behaviors needed to become competent, caring and contributing citizens by: taking on leadership roles in their youth organizations and schools, and working in partnership with adults in a variety of settings. Youth and adults demonstrate effective partnerships through increased youth participation on advisory committees and other governing bodies. Volunteers and youth development professionals apply practices fostering positive youth development.
6	Medium Term - Lindley G Cook 4-H Youth Center for Outdoor Education: Science, Engineering and Technology Camp 2013 - Youth apply knowledge, attitudes, skills, and behaviors needed to become competent, caring and contributing citizens by: taking on leadership roles in their youth organizations and schools, and working in partnership with adults in a variety of settings. Youth and adults demonstrate effective partnerships through increased youth participation on advisory committees and other governing bodies. Volunteers and youth development professionals apply practices fostering positive youth development.
7	Long Term - 4-H SET (Science, Engineering, and Technology): Ambassadors Program in Urban Essex and Passaic Counties - Youth demonstrate mastery and competencies needed to become engaged by assuming leadership positions in communities; developing and implementing action plans to address community needs, and becoming productive members of the workforce. 4-H youth are engaged partners in decision making regarding RCE programming including but not limited to 4-H youth development programming. 4-H alumni

	and volunteers become engaged citizens by assuming leadership positions in communities. Youth development professionals and stakeholders influence decision makers in policy development related to youth development needs and issues.
8	Long Term - Jersey Roots/Global Reach: 4-H Climate Science Education Program - Youth demonstrate mastery and competencies needed to become engaged by assuming leadership positions in communities; developing and implementing action plans to address community needs, and becoming productive members of the workforce. 4-H youth are engaged partners in decision making regarding RCE programming including but not limited to 4-H youth development programming. 4-H alumni and volunteers become engaged citizens by assuming leadership positions in communities. Youth development professionals and stakeholders influence decision makers in policy development related to youth development needs and issues.
9	Long Term - New Brunswick 4-H Program - Youth demonstrate mastery and competencies needed to become engaged by assuming leadership positions in communities; developing and implementing action plans to address community needs, and becoming productive members of the workforce. 4-H youth are engaged partners in decision making regarding RCE programming including but not limited to 4-H youth development programming. 4-H alumni and volunteers become engaged citizens by assuming leadership positions in communities. Youth development professionals and stakeholders influence decision makers in policy development related to youth development needs and issues.

Outcome #1

1. **Outcome Measures**

Short Term - Youth increase awareness, knowledge, attitudes, and skills related to essential elements, workforce development, life skill development, and relevant subject matter. Volunteers increase knowledge and awareness of practices fostering positive youth development, including youth/adult partnerships. Youth development professionals and stakeholders increase awareness and knowledge of problems and solutions supporting positive youth development, including: policies that need to be addressed,community resources and support.

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Medium Term - Youth apply knowledge, attitudes, skills, and behaviors needed to become competent, caring and contributing citizens by: taking on leadership roles in their youth organizations and schools, and working in partnership with adults in a variety of settings. Youth and adults demonstrate effective partnerships through increased youth participation on advisory committees and other governing bodies. Volunteers and youth development professionals apply practices fostering positive youth development.

2. **Associated Institution Types**

- 1862 Extension
- 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)
New Jersey Operation: Military Kids (NJOMK)

Thousands of New Jersey service members have been deployed to serve in the wars in Iraq and Afghanistan. Over 18,000 New Jersey youth have a parent serving in the military. Most of these youth have experienced a loved one?s deployment during this conflict and many have experienced multiple deployments.

What has been done
Through a wide variety of programs, military youth discover positive strategies to manage the stress related to their family member?s deployment.
NJ OMK has developed several programs used at events throughout the year. Hero Packs represent a tangible way to hand-deliver a salute to military children for their strengths and sacrifices. A Hero Pack serves as an expression of community gratitude and OMK partner support for military children. In 2013, youth and adult volunteers assembled Hero Packs at 4 events. As a result, OMK recognized 75 military children with Hero Packs. Ready, Set, Go! (RSG!) Training is a multi-faceted interactive training that is tailor-made to audiences in a variety of settings. The training provides hands-on practical information to assist participants in building community capacity and educating community members about the needs of military children and youth. In 2013, 15 people were trained and several briefings were held, reaching hundreds of community members. Benefactors include guidance counselors, educators, 4-H extension agents and new OMK State Team Members. The Mobile Technology Lab (MTL) helps youth learn to tell their stories and share information with others while developing communication and teamwork skills. Youth used MTL?s to create movie trailers and video public service messages, sharpen their photography skills, play educational games, and write music. Speak Out for Military Kids (SOMK) is a program designed for teens with an interest in increasing community awareness about the unique issues facing children with deployed parents. Teen participants serve as a speakers? bureau for the SOMK initiative.

Results
Virginia Tech University is leading the effort to develop and implement a comprehensive evaluation instrument to collect outcomes on a national level.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #3

1. Outcome Measures

Long Term - Youth demonstrate mastery and competencies needed to become engaged by assuming leadership positions in communities; developing and implementing action plans to address community needs, and becoming productive members of the workforce. 4-H youth are engaged partners in decision making regarding RCE programming including but not limited to 4-H youth development programming. 4-H alumni and volunteers become engaged citizens by assuming leadership positions in communities. Youth development professionals and stakeholders influence decision makers in policy development related to youth development needs and issues.

2. Associated Institution Types

- 1862 Extension
- 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)
NJ 4-H Science Education/Rutgerscience Saturday Program

There is an overall decline in student achievement in STEM. 4-H as one of its mission mandate areas has dedicated resources and expertise to expand and improve STEM programming in NJ.

What has been done
Our 4-H Rutgerscience Saturday program engages young people grades 5-9 in cutting edge science at Rutgers University. Students work with university faculty to explore current areas of research. The Climate and Environmental Change Summit is a multi-day on campus event for middle and high school students designed to increase knowledge and understanding of climate change science through interaction with Rutgers University scientists. Ocean days for K-12 students (3-5, 6-8 9-12) bring students to campus to study current ocean science themes and conduct a ?science fair? on campus in collaboration with Rutgers oceanographers and environmental scientists. The Science of Soil program engages middle school youth in learning about New Jersey soil, culminating a science project that invites students to collect soil data and share it using a specially developed iPad app. 4-H Summer Science program brings 9-12 grade students from NJ urban centers to campus for a week long residential program. This program is

designed to encourage underrepresented youth in STEM careers.

Results
Overall, the 2013 participants felt empowered to be leaders within their communities and that environmental issues were worthy of their time and attention. Over the four years we have been offering the 4-H Climate and Environmental Change Teen Summit, 100% of the students noted in their post-survey they could make a positive impact by reducing their carbon footprint and encouraging others (family, school, and friends) to do the same. In the 4-H Summer Science program we see positive shifts in young peoples? perception of their own participation in science. Pre and Post test results (n=48) show youth are more interested in working with scientists to solve problems and learning about new science discoveries.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #4

1. Outcome Measures

Medium Term - 4-H North Jersey Teen Conference - Youth apply knowledge, attitudes, skills, and behaviors needed to become competent, caring and contributing citizens by: taking on leadership roles in their youth organizations and schools, and working in partnership with adults in a variety of settings. Youth and adults demonstrate effective partnerships through increased youth participation on advisory committees and other governing bodies. Volunteers and youth development professionals apply practices fostering positive youth development.

2. Associated Institution Types

- 1862 Extension
- 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)
4-H North Jersey Teen Conference

Inspiring and training youth to become leaders in their classrooms, sports teams, organization activities, communities, and jobs is important. But defining just what a leader is or does can be

tricky. Some say that leaders are born and others say that leaders can be created. The Teen Leadership program provides youth with a solid foundation of knowledge and information about leadership and creates awareness in youth that everyone has the capacity to lead given the necessary tools and training.

What has been done
The North Jersey 4-H Teen Conference (NJTC) is a 3-day educational program for 4-H members in grades 8 through 13 (the first year of college)
The development of this conference was based on demonstrated interest of 4-H teens in coordinating a conference for 4-H teens from 10 northern New Jersey counties. The conference focuses on leadership development, team building, service learning and building youth-adult partnerships. A planning committee of 4-H teens and adults representing their respective county 4-H programs meet monthly to plan, implement, deliver, evaluate the conference, and continue to provide leadership year after year to sustain the conference.

Results
As a result of their participation in the conference, youth reported increased life skills and future actions as follows: Life Skills: 67% improved ability to work in a team, 59% increased leadership skills, 58% greater confidence, 55% enhanced self-esteem, 58% improved ability to work in partnership with adults, 49% improved ability to speak in public, 59% increased communication skills (new in 2013), 54% increased self-motivation (new in 2013), 53% planning and organizing skills (new in 2013). Next Actions: 95% will do something new or different, 87% will change the way I think, act or behave, 95% Plan to use or share what I learned. This program was the 2013 National Winner for the Beyond Youth Leadership Award from the National Association of 4-H Extension Agents.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #5

1. Outcome Measures

Medium Term - New Jersey 4-H Horse Program - Youth apply knowledge, attitudes, skills, and behaviors needed to become competent, caring and contributing citizens by: taking on leadership roles in their youth organizations and schools, and working in partnership with adults in a variety of settings. Youth and adults demonstrate effective partnerships through increased youth participation on advisory committees and other governing bodies. Volunteers and youth development professionals apply practices fostering positive youth development.

2. Associated Institution Types

- 1862 Extension
- 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)
New Jersey 4-H Horse Program

Youth grades 1-13 from almost every county in the state can and do participate in some fashion. The subject matter, life and workforce skills these youth gain from participating in this program are exceptional because there are so many different opportunities for youth to learn and so many different ways for this learning to take place.

What has been done
The New Jersey 4-H Horse Project continues to be one of the largest 4-H projects in the state with over 1,600 club members in 2013. State 4-H events include the Model Horse Show, Equine Art Show, Equine Presentations, Horse Bowl, Hippology and Horse Judging contests and the State 4-H Horse Show. Each year a team of 16 youth and their coaches prepare for the Eastern National 4-H Round Up competitions. In 2013, The New Jersey Equine Presentations team placed second overall and our Speech competitor won her category with her speech on the Head ImPACT concussion test. All other teams placed in the top 10 in that national contest. Every individual on the teams received individual placing awards as well.

Results
The subject matter, life and workforce skills these youth gain from participating in this program are exceptional because there are so many different opportunities for youth to learn, and so many different ways for this learning to take place. Two hundred youth from twelve (12) counties participated in the New Jersey 4-H Horse Show in 2013. Thirty (30) participants in the show noted an improvement in riding and horse care skills from that event. Twenty four (24) youth said they would share and use information they learned at the show at another time in their 4-H horse project. One hundred and eleven (111) youth from thirteen (13) counties participated in the State 4-H Horse Bowl. Twenty one (21) of those participants learned team work skills and learned about anatomy, physiology and horse care. Eighteen (18) of the participants plan to use the information they learned during horse bowl in other competitions, when working with their horse or when they study to become a horse breeder/owner or veterinarian. Fifty Six (56) youth participated in the Horse Judging and Hippology Contests in 2013. Of those Forty two (42) reported learning skills in decision making, public speaking, team work and how to judge soundness in a horse. Forty three (43) reported gaining skills they plan to use when they buy a horse or tack, when they attend veterinarian school or when they become a horse trainer or owner. These life skills taught by participating in the state 4-H horse program will stay with the members for their vocation or advocation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #6

1. Outcome Measures

Medium Term - Lindley G Cook 4-H Youth Center for Outdoor Education: Science, Engineering and Technology Camp 2013 - Youth apply knowledge, attitudes, skills, and behaviors needed to become competent, caring and contributing citizens by: taking on leadership roles in their youth organizations and schools, and working in partnership with adults in a variety of settings. Youth and adults demonstrate effective partnerships through increased youth participation on advisory committees and other governing bodies. Volunteers and youth development professionals apply practices fostering positive youth development.

2. Associated Institution Types

- 1862 Extension
- 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)
Lindley G Cook 4-H Youth Center for Outdoor Education: Science, Engineering and Technology Camp 2013

America faces a future of intense global competition with a startling shortage of scientists. Only 18 percent of U.S. high school seniors are proficient in science (NAEP 2005) and a mere 5 percent of current U.S. College graduates earn science, engineering, or technology degrees compared to 66 percent in Japan and 59 percent in China.

What has been done
In 2009 Lindley G. Cook 4-H Camp offered its first S.E.T. camp with 22 participants taking part in three exciting subject areas. In 2013 the program has grown to 77 campers. The residential SET camp provides non-formal education with hands-on inquiry-based learning in a youth development context. Classes were developed using a number of resources, including the ?Design It! Engineering in Afterschool Programs? curriculum, which is the foundation of the Super Coasters class. The Sea Perch kits were highly successful in the Ocean Robotics course. Resources from NASA and ESTES were used in the rocketry program.

Results
Campers were surveyed online after their experience at SET camp. At camp, the children said they learned: to work as part of a team (87.5%), to try new things (87.5%), that learning can be

fun (62.5%), to feel good about myself (62.5%), grown-ups can be fun too (87.5%), and to respect and get along with all different kinds of people (75.0%). The top three answers given to the question about the three top things they liked best about coming to came was: I get to do hands on activities and projects, I meet other kids interested in science like me, I can see science in a fun way/I get positive feedback from adults and other kids. All of the campers except one indicated that they would return to SET camp next year, and six campers indicated they would be interested in attending the summer camp program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #7

1. Outcome Measures

Long Term - 4-H SET (Science, Engineering, and Technology): Ambassadors Program in Urban Essex and Passaic Counties - Youth demonstrate mastery and competencies needed to become engaged by assuming leadership positions in communities; developing and implementing action plans to address community needs, and becoming productive members of the workforce. 4-H youth are engaged partners in decision making regarding RCE programming including but not limited to 4-H youth development programming. 4-H alumni and volunteers become engaged citizens by assuming leadership positions in communities. Youth development professionals and stakeholders influence decision makers in policy development related to youth development needs and issues.

2. Associated Institution Types

- 1862 Extension
- 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)
4-H SET (Science, Engineering, and Technology): Ambassadors Program in Urban Essex and Passaic Counties

According to the National Science Foundation?s Strategic Plan for 2011 ? 2016 ?the nation must maintain a robust science, technology, engineering, and mathematics work force.? One of their efforts is to expand participation in the STEM work force by currently underrepresented segments

of the population ? women, minorities and persons with disabilities.

What has been done
From NJ Urban Counties underrepresented youth grade 9-12 participated in the 4-H Summer Science program on campus for a week long residential program designed to encourage youth in STEM careers. 4-H SET Ambassadors from Essex and Passaic Counties received additional training and began planning science programs and events which they teach to younger youth in their home communities. The program also allows them to develop and empower many life skills, including critical thinking, teamwork, public speaking, teaching, program planning and implementation.

Results
Evaluation results from year 3 of the 4-H Science Initiative found that after spending time in 4-H Science programs 59% of youth said they would like to have a job related to science when they graduate from high school and 59% want to finish college. Teens who participate as SET Ambassadors are exposed to not only various fields of science but also to the field of youth development and teaching. They are sharing their enjoyment of science with other underrepresented youth and having a positive impact becoming agents of change in their environments.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #8

1. Outcome Measures

Long Term - Jersey Roots/Global Reach: 4-H Climate Science Education Program - Youth demonstrate mastery and competencies needed to become engaged by assuming leadership positions in communities; developing and implementing action plans to address community needs, and becoming productive members of the workforce. 4-H youth are engaged partners in decision making regarding RCE programming including but not limited to 4-H youth development programming. 4-H alumni and volunteers become engaged citizens by assuming leadership positions in communities. Youth development professionals and stakeholders influence decision makers in policy development related to youth development needs and issues.

2. Associated Institution Types

- 1862 Extension
- 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)
Jersey Roots/Global Reach: 4-H Climate Science Education Program

Over 8% of the state?s population live below the poverty level and that percentage more than doubles in the state?s most at-risk communities. This increasingly widening gap between income levels, the country?s overall poor economic issues, and changes in family stability and employment as a result leave New Jersey families and youth facing challenges regarding overcrowded schools, poor performance and other issues related to school attendance, lack of quality jobs, involvement in negative behaviors, and other negative societal issues greatly increases the negative outcomes for school age youth.

What has been done
4-H Agents work with youth grades 4-H in the Jersey Roots, Global Reach program, which specifically focuses on the essential principles of complex interactions, human activities and change, and natural variability and change. Activities exploring the key principles of the carbon cycle, the relation of temperature to carbon dioxide, the movement of energy, water and carbon, annual cycles, and understanding the concepts of weather and climate as it relates to the historical timeline of climate and climate change will establish the scientific knowledge base of climate change. Using case studies and other lesson activities, youth develop an understanding of global warming and climate change issues and how they impact disadvantaged people. This knowledge base and understanding provides the framework for youth to develop and implement action projects that are significant to them and their local communities.

Results
A total of 209 youth completed the entire program and evaluation results revealed that: Youth will increase knowledge in climate change, 85% know the basic process and importance of the Earth?s greenhouse effect. Youth developed and demonstrated skills in technology, 91% know how to make and use weather sensing equipment. Youth will address local climate change issues through service projects, 85% can do more to reduce personal carbon footprint. Youth communicate accurate knowledge and their concerns about climate change and/or climate justice issues in their local communities, 90% learned: more about their community, how to find ways to fix a community need, understanding the needs of others, setting goals of a service learning project, how to talk with others, including adults, solve a community problem, how to work as a group, and to complete a project.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #9

1. Outcome Measures

Long Term - New Brunswick 4-H Program - Youth demonstrate mastery and competencies needed to become engaged by assuming leadership positions in communities; developing and implementing action plans to address community needs, and becoming productive members of the workforce. 4-H youth are engaged partners in decision making regarding RCE programming including but not limited to 4-H youth development programming. 4-H alumni and volunteers become engaged citizens by assuming leadership positions in communities. Youth development professionals and stakeholders influence decision makers in policy development related to youth development needs and issues.

2. Associated Institution Types

- 1862 Extension
- 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)
New Brunswick 4-H Program

Research shows that supportive, community based educational programs offer a means of reaching at-risk youth, and that establishing programs for youth at an early age increases the likelihood of significant positive impact on the skills, attitudes, and experiences of young people, (Villarruel, Perkins, Borden, & Keith, 2003). A significant portion of New Jersey?s Spanish speaking youth are at a substantial risk for negative life outcomes including poor health, substance abuse, school failure and violence. Latino youth in New Jersey, and New Brunswick, are at great risk due to their poverty and challenges with educational achievement.

What has been done
The New Brunswick 4-H program was developed to meet these needs, utilizing the structure and philosophy of 4-H, while working in collaboration with community organizations and Rutgers University students. For the past 4 years the New Brunswick 4-H program has been successful in meeting these needs. 4-H continues to provide opportunities for youth grades K-13 to participate in clubs and special interest programs with a focus on developing skills in communication, leadership, citizenship, decision making and development of a positive self-concept. This has been accomplished through 4-H club and special interest programs.

Results

In 2013, the New Brunswick 4-H program continued to demonstrate opportunities for members to become integrated into the county and state 4-H program. A new partnership with New Brunswick High School has resulted in 14 high school youth taking part in an internship with the New Brunswick 4-H program. They assist with program outreach.

Retrospective pre-post surveys were conducted with 4-H youth. Survey results indicated an increase in goal setting skills, communication skills, decision making skills, and an increase in the interest in participating in community service projects. Almost 100% of youth indicated they were more accepting of differences at the end of the year, and more comfortable with planning and running community service projects at the end of year. Due to continued increase in partnerships and collaborations with local agencies and Rutgers University departments, the New Brunswick 4-H program has increased its visibility and credibility. There is a sustainable process in place for recruitment and retention of 4-H programs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

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
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Youth risk factors)

Brief Explanation

None to report.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

NJAES research and extension outcomes related to this planned program were evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we included the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys were used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we focused on program delivery, participation, relevance and timeliness. Data was collected at appropriate times for each initiative that supports this planned program. IRB approved evaluation instruments were used to collect research and extension data. Data analyses and

comparisons relevant to basic and applied research and demonstration were collected and analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions. See state defined outcomes for detailed results of each initiative.

Key Items of Evaluation

Virginia Tech University is leading the effort to develop and implement a comprehensive evaluation instrument to collect outcomes of the Operation Military Kids Program.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Global Food Security and Hunger - Agricultural Viability

☑ 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
205	Plant Management Systems	20%		20%	
211	Insects, Mites, and Other Arthropods Affecting Plants	20%		20%	
215	Biological Control of Pests Affecting Plants	20%		20%	
601	Economics of Agricultural Production and Farm Management	20%		20%	
604	Marketing and Distribution Practices	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	65.0	0.0	36.0	0.0
Actual Paid Professional	41.4	0.0	0.0	0.0
Actual Volunteer	96.0	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**
947104	0	1348247	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3999390	0	4393230	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
515359	0	2915185	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Identify critical programmatic foci/needs based on Extension and stakeholder assessment. These can be broadly defined under three areas:

- Production BMPs (nutrient, pest, waste/by-products management, water quality and quantity, energy)
- Financial BMPs (marketing, labor, risk management, policy e.g. farmland preservation)
- Ag Systems (sustainable ag, organic ag, new crops and use/alternative)

Develop an inventory of local (county based), regional and statewide programs designed to meet these needs; identify team members and their roles.

Create a multi-task effort to generate and share research-based information with clientele through demonstrations, educational meetings and workshops, certification programs, trainings, development of recommendation and decision making guides, etc.

2. Brief description of the target audience

Stakeholders (broadly defined to include producers, processors, marketers, end-users, policymakers, legislators).

Commercial agriculture producers and end-users (such as marketers, processors, consumers, etc.).

Municipalities and other governmental and non-governmental agencies, etc.

3. How was eXtension used?

RCE faculty and staff participated in the following CoPs: E Organics, Financial Security for All, Learn Network, Farm Energy, and Organic Farming. Faculty answered ask the expert questions, developed collaborative educational products, and coducted learn professional developement sessions.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	30537	26924	10782	8207

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

Patent Applications Submitted

Year:	2013
Actual:	59

Patents listed

200700265
201200052
200800180
200700384
200800330
200800329
200700372
200700373
200700428
200700452
200700264
200700263
200900133
200900134
200900135
201000033
200900425
200700271
200900426
200700385
200800161
201000330
200700269
200900290
200900284
200800129
200900005
200700422
200700427
201300033
201300137
201300142
201300365
2001200103
201300191
201300032
201300430
201300431
201300436
201300437
201300461
201300478
201300479
201300344
201300351
201300356
201300368
201300381
201300428
201300429

2011-166
2011-167
2011-168
2011-169
2013-035
2013-040
1998-0017
2010-106

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	60	89	149

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications,and publications.In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected.

Year	Actual
2013	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Short Term - Increases in knowledge and skills of agricultural and horticultural industry professionals will occur relating to: Nutrient management Pest management Waste/by-products management and utilization Improving water quality and conserving water Conserving energy Marketing skills Labor management Risk management Policy e.g. farmland preservation Sustainable ag and organic ag production methods New crops and use/alternative crops
2	Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.
3	Long Term - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.
4	Medium Term - NJAES Research and Outreach to Promote Agricultural Retention and Development in Urbanizing Regions - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.
5	Medium Term - Fungicide Resistance to Important Fungicide Chemistries in Vegetable Production - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.
6	Medium Term - Organic Grower Outreach - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound

	management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.
7	Long Term - Pepper Evaluations for Phenotypic Traits, Physiological Disorders, Diseases and Cultural Practices - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.
8	Long Term - Annie?s Project New Jersey - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.
9	Long Term - Development of Best Management Practices for Suppression of Anthracnose Disease on Annual Bluegrass Turf - 2013 - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.
10	Long Term - Turfgrass Breeding and Evaluation - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.
11	Long Term - Breeding and Germplasm Enhancement for New Jersey Cranberry and Blueberry Industries - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.
12	Long Term - Conservation and Utilization of Plant Genetic Resources - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.
13	Long Term - Integrating Crop Pollination by Native Bees into Agricultural Pollination Management and Maintaining Native Pollinators and their Habitats - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.

Outcome #1

1. Outcome Measures

Short Term - Increases in knowledge and skills of agricultural and horticultural industry professionals will occur relating to: Nutrient management Pest management Waste/by-products management and utilization Improving water quality and conserving water Conserving energy Marketing skills Labor management Risk management Policy e.g. farmland preservation Sustainable ag and organic ag production methods New crops and use/alternative crops

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
Biological Improvement of Chestnut through Technologies that Address Management of the Species, its Pathogens and Pests

Chestnut blight disease virtually wiped out the American chestnut in the last century. Chestnuts continue to populate the northeast US in low numbers, and one of the factors that appears to be responsible for their continued survival is debilitation of the lethal fungus, Cryphonectria parasitica, by viruses that attack the fungus. These viruses therefore provide a form of biological control. Biological control of plant pathogenic fungi such as the chestnut blight fungus has the potential to reduce the need to use pesticides while controlling plant disease, resulting in sustainable disease management. The nucleotide sequence of a second reovirus of C. parasitica, designated MyRV-2, was completed during this project. It represents the third mycoreovirus whose sequence has been determined in its entirety. MyRV-2 was originally isolated approximately 20 miles from MyRV1, which has proven to be an excellent model for examining reovirus molecular biology. MyRV-2 has properties that are distinct from MyRV-1, including diverged sequence and markedly different effects on host phenotype. Five new hypovirulent isolates of C. parasitica were identified in Hartshorne Park, Tindall Park, and Huber Woods, all near Middletown, NJ. This represents one of the only places in the state where surviving Native American chestnut trees can still be found, and it appears that hypovirulence of

the fungus is likely responsible for tree survival. The five isolates have similar colony morphology to Cryphonectria hypovirus 2-infected isolates characterized in the past from a similar area of the state. Single conidial isolations confirmed that the hypovirulent phenotype segregated in single conidial isolates, and that transmission of the presumed virus was at a rate of less than 10%. It appears that CHV-2 is common in this part of New Jersey. We continue the deeper characterization of these isolates and others from surviving trees in the area. Completion of the fungal genome sequence of C. parasitica as a community sequencing project in which we participated provides substantial understanding not only of this specific pathogen but of the fungus that is one of the most important targets of biological control with viruses. One of our roles in that effort has been the analysis of its transposable elements. Approximately 10% of the C. parasitica genome was found to represent transposable elements, most of them in the retrotransposons family Metaviridae. A key finding was the invasion of the mating type gene cluster of C. parasitica by these transposable elements. This bioinformatic analysis has not yet been completed, but will represent an important component in the epigenetic analysis of the organism, one of the key issues in the biology of eukaryotes. Seminars summarizing and updating this research have been given locally, nationally, and internationally. In addition, results from this project have directly informed and benefited scientists associated with several other federally funded research projects.

What has been done
NJAES researchers continued to develop and evaluate blight resistant chestnut trees for food and fiber through traditional and molecular techniques that incorporate knowledge of the chestnut genome, which is now being sequenced; evaluate biological approaches for controlling chestnut blight from the ecological to the molecular level by utilizing knowledge of the fungal and hypovirus genomes to investigate the mechanisms that regulate virulence and hypovirulence in C. parasitica, and investigate chestnut reestablishment in orchard and forest settings with special consideration of the current and historical knowledge of the species and its interaction with other pests and pathogens.

Results
This work resulted in the establishment of breeding orchards for generating larger number of backcross generations for forest and orchard testing of pest resistance and regional adaptability; evaluation of genomic data of Castanea to identify genes that confer desirable traits and enable rapid screening for those traits; development of in vitro mass propagation systems for Castanea spp. so that elite genotypes from breeding programs and genotypes engineered with anti-fungal genes can be clonally propagated for reforestation; evaluation of the chestnut blight fungus genome to further our understanding of the genetic basis for pathogenesis and hypovirus regulation; development and deployment of the first genetically engineered virus for enhanced biocontrol of a plant pathogen; utilization of biological control agents to reduce the impact of chestnut blight and other pests and pathogens. In the longer-term, the project will lead to the return of an important timber species, major mast species for wildlife, a new cellulosic biomass energy crop, a new commercial nut crop; and, a new 'green' alternative to pressure-treated lumber for durable wood and outdoor uses.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management

604 Marketing and Distribution Practices

Outcome #3

1. Outcome Measures

Long Term - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.

2. Associated Institution Types

- 1862 Extension
- 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)
Crop insurance Education of NJ Farmers

New Jersey is home to about 10,200 farms, which produce approximately 32,000 cattle and calves, 8,000 hogs and pigs, and 7,000 cows which produce annually 31 million pounds of milk. Furthermore 90,000 acres are in corn production and 96,000 acres of soybeans are grown annually. Recent changes in climate conditions have led to some unpredictable weather that has proven quite damaging for some crops, because of the unreliable conditions it is in the farmer?s best interests to cover their risks using crop insurance.

What has been done
Experienced educators delivered training to over 4,777 producers through a wide variety of educational venues including 175 meetings, which included 119 one-on-one sessions, 43 workshops/meetings, and thirteen conferences/sessions, all geared toward the particular interest of the producer. During the program, fourteen newsletters, nine postcards, nineteen information guides, nine bulletins, seventeen blogs, and ten radio public service announcements reached 200,029 producers and individuals in a timely manner. Utilizing press releases and issuing various bulletins in the print media allowed the program to reach a large volume of producers and individuals. A Winter and Summer Newsletter reached 7,562 producers. We placed special emphasis on providing services to small farms and ranchers, socially disadvantaged producers, and traditional commercial producers. We also targeted beginning farmers, immigrant farmers, Native Americans, and farmers seeking production changes. An essential component of the program was the direct contact (one-on-one) with producers resulting in the education of 271

individuals. Methods for reaching producers included one-on-one visits, workshops, crop insurance meetings, county boards of agriculture presentations, agricultural conventions and trade shows.

Results
In 2013, almost 175,000 acres of New Jersey?s farmland was insured through crop insurance with 1,565 policies sold in the state. With the recent unpredictable weather, it is imperative to not only maintain but continue to increase the crop insurance policies sold in NJ through the use of crop insurance education and outreach.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #4

1. Outcome Measures

Medium Term - NJAES Research and Outreach to Promote Agricultural Retention and Development in Urbanizing Regions - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
NJAES Research and Outreach to Promote Agricultural Retention and Development in Urbanizing Regions

New Jersey is the most densely populated and highly urbanized state in the Nation, but simultaneously possesses a rich farming history and a long track record of progressive policy to sustain a vibrant agricultural industry. For these reasons, the State is a natural laboratory for policy research and scholarly work on agricultural retention and development.

What has been done
The Extension Specialist implemented a program of research and outreach advancing the current NJAES mission "to enhance the vitality, health, sustainability and overall quality of life in New Jersey by developing and delivering practical, effective solutions to current and future challenges to agriculture" This was accomplished by examining several aspects of the State's current or emerging farm retention efforts. These include: examining outcomes of the State's long standing, and nationally recognized farmland preservation program in the context of statutory goals, examining opportunities and challenges facing farmers seeking to enhance financial sustainability through agritourism, and evaluating prospects for more effective planning for agricultural retention and development at the local levels of government.

Results
A Northeast regional assessment of farmers' needs was conducted to assess engagement/interest in agritourism enterprise development, as well as perceived challenges and opportunities for future growth. This research informed the development of targeted educational training materials that are responsive to these needs. An example of programmatic impact is the contributions made to the development of policies (known formally as an agricultural management practice) needed to clarify the extent of protections afforded to direct marketers and agritourism operators under the state right to farm statute. Another example is the creation and co-management (with a farm direct marketing association) of a centralized, statewide marketing platform for agritourism and direct marketing farms. Www.visitnjfarms.org is a key economic development strategy for this sector of New Jersey agriculture. Agritourism programming is featuring directly in policy discourse. For example, an empirical assessment quantified the impact of agritourism development on farm profitability and identified the farm types that are likely to benefit the most financially from this form of alternative enterprise development. This type of information moves policy discussions from a reliance on theorized or anecdotal accounts of industry benefits to one that is empirically grounded in credible science. It similarly helped to justify the substantial programming aimed at promoting visitor and employee safety on agritourism farms and managing farmers' exposure to legal liabilities. It also has generated the support necessary to develop and launch a statewide website for agritourism/direct marketing promotion (190 farms are registered). This research informed the development and passage of legislation revising the New Jersey Farmland Assessment statute (the state's differential assessment law for qualified agricultural land).

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #5

1. Outcome Measures

Medium Term - Fungicide Resistance to Important Fungicide Chemistries in Vegetable Production - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
Fungicide Resistance to Important Fungicide Chemistries in Vegetable Production

In the mid-Atlantic region of the United States over 200,000 Acres of fresh-market and processing vegetable crops are grown on an annual basis. The development of fungicide resistance to important fungicide chemistries used in vegetable production has been documented in New Jersey and the mid-Atlantic region in recent years. A number of these commonly-used chemistries have a high-risk for resistance development if they are overused or used improperly on fungicide chemistries (i.e. modes-of-action, FRAC codes) in order to manage fungicide resistance development properly.

What has been done
20,000 fungicide resistance management guidelines have been distributed in the mid-Atlantic and surrounding region representing over 100,000 Acres of vegetable production. Approximately

1,800 of the guides were distributed to commercial vegetable growers, crop consultants, industry representatives, crop advisors, Extension agents and Extension specialists in 2013 in New Jersey and other states. The resistance management guides have become widely adopted and used by many vegetable growers to help develop effective season-long fungicide spray programs while helping to reduce the chances for fungicide resistance development in the region. Recommendations guides are updated annually and available on-line through the Vegetable Crops On-line Resource Center hosted by the New Jersey Agricultural Experiment Station (http://plant-pest-advisory.rutgers.edu/) and other state experiment station websites.

Results
Although no formal survey was done in 2013, demand for the FRAC guide remains high and each year the fungicide resistance management guide is distributed to more vegetable growers in the mid-Atlantic and surrounding region.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #6

1. Outcome Measures

Medium Term - Organic Grower Outreach - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
Organic Grower Outreach

Historically organic growers have either not relied on Extension and have expressed displeasure in the lack of outreach specific to their needs.

What has been done
The Mercer County Agriculture professional has worked on developing a relationship with NOFA NJ, by conducting partner workshops and presenting at the Annual Winter Conference. Offering organic specific programming. Holding round-table meetings with organic growers. Develop relationships with out-of-state Extension personnel engaging in organic grower outreach.

Results
Growers are made aware of Extension programming and resources. Organic growers have begun participating in more Extension programs including grower advisories and the NJ Agriculture Convention and Trade Show. Forty-Six organic growers participated in the GAPs for Small Farms workshop, as a result of this class: 93% of participants increased their knowledge of the Food Safety Modernization Act, 100% of participants increased their knowledge on Good Agricultural Practices (GAP) and small farms, 100% of participants increased their knowledge on the components of an on-farm food safety plan, 96% of participants increased their ability to identify food safety concerns and risk areas for their farms, 100% of participants increased their ability to develop a non-audit based food safety plan, 86% of participants have decided to educate workers on health and hygiene, 89% of participants have decided to create written farm policies and standard operating procedures.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #7

1. Outcome Measures

Long Term - Pepper Evaluations for Phenotypic Traits, Physiological Disorders, Diseases and Cultural Practices - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.

2. Associated Institution Types

- 1862 Extension
- 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)
Pepper Evaluations for Phenotypic Traits, Physiological Disorders, Diseases and Cultural Practices

New Jersey grows 3,700 acres of peppers for a value of $28,800,000 a year and is ranked third in the nation. The principal disease problems with peppers are Phytophthora blight, anthracnose and bacterial leaf spot (BLS). The number one disease problem in New Jersey is phytophthora blight (phytophthora capsici) which is endemic in southern New Jersey.

What has been done
RCE Agricultural Agents continued work on bell pepper cultivar evacuation to: select cultivars that have tolerance or resistance to phytophthora blight with good horticultural characteristics; evaluate cultivars for the presence of skin separation (silvering); determine if any phytophthora tolerant or resistance cultivars are acceptable for red pepper production; and determine the races of bacterial leaf spot found in New Jersey. In 2013, 22 cultivars and advanced breeding lines were arranged in a randomized complete block design with four replication at one location to assess disease tolerance, fruit type and susceptibly to silvering. Advanced breeding lines and commercially available cultivars are screened in a naturally infested field. Materials which have both tolerance to disease and good horticultural characteristics are recommended to growers for trial planting on their farms.

Results
Growers have saved around $22,000,000 over the last fifteen years from using culivars tolerant or resistant to phytophthora blight. All the recommended cultivars and the main ones grown in New Jersey were evaluated through our screening system. Since new cultivars are being release each year, growers and seed companies ask for this research to continue.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants

215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #8

1. Outcome Measures

Long Term - Annie?s Project New Jersey - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.

2. Associated Institution Types

- 1862 Extension
- 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)
Annie?s Project New Jersey

According to the 2007 Census of Agriculture, 22 % of New Jersey?s 10,327 farms are managed by a woman, and that number is increasing. The 2007 Census also reported that 267 New Jersey women farmers have two years or less on-farm experience, 429 have three to four years? experience, and 1,289 have five to nine years? experience. These statistics demonstrate that we have a large women farm population that are beginning farmers and would benefit from Annie's Project New Jersey: Risk Management for Beginner Farmers and the other Annie?s Project New Jersey programming.

What has been done
Extension Specialists and Agricultural Agents developed and implemented Annie?s Project II: New Jersey Farm Women?s Conference 2013 designed to improve the economic stability of traditional underserved women farmers. It focuses on creating a farm business plan throughout the training, the use of social media education and adoption for marketing and business development, the use of social media tools to assist the participants in networking that is sustainable and interactive, long after the course is completed, using a unique combination of in-person education and distance learning opportunities to expand the audience within the program, and recording the distance learning sessions for asynchronous education of participants and

additional women farmers following the completion of the ?live? course.

Results
Annie?s Project New Jersey has resulted in scholarly deliverables as well as positive changes in the lives of program participants. In addition to serving as a resource for farmers in New Jersey, these resources are being used in other states. Participants reported they are able to make discussion on purchasing and updating insurance calculate net worth, create a household budget and assess current financial situation in order to create a financial plan. Draft an estate plan and become aware of networking opportunities with other farm women. This program has been modified for local conditions and taken to Turkey and Guyana where it has received equally positive results, local support, and tremendous local press. See: http://aesop.rutgers.edu/~farmmgmt/suzannes_project2013/suzannes_project.html.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #9

1. Outcome Measures

Long Term - Development of Best Management Practices for Suppression of Anthracnose Disease on Annual Bluegrass Turf - 2013 - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.

2. Associated Institution Types

- 1862 Extension
- 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)

Development of Best Management Practices for Suppression of Anthracnose Disease on Annual Bluegrass Turf - 2013

Turfgrass is a valuable and rapidly expanding component of our urban and rural landscape. Turfgrass is used to stabilize soil and produce a playing surface on more than 17,000 golf courses in the US. Golf courses are an important component of the turfgrass industry providing a source of green space in the urban environment and offering recreation and enjoyment for approximately 36 million Americans. Golf courses also generate jobs, commerce, economic development, and tax revenues for communities throughout the country.

What has been done

Due to the increasing severity of anthracnose on golf courses in North America, studies were initiated at ten universities (CA, CT, IN, MD, MI, NC, NJ, NY, PA and ON [Guelph, Canada]), including Rutgers as part of a multistate turf regional research project (NE-1046). The anthracnose portion of this project was to develop and disseminate a set of best management practices (BMPs) to golf course superintendents that would result in successful control of anthracnose in a sustainable manner, while reducing pesticide inputs and maintaining acceptable turfgrass quality.

Results

Based on a validation of the research conducted for this project in 2012 and 2013, different combinations of BMP cultural management factors resulted in the following reductions in fungicide usage (i.e., few fungicide applications required to control the disease compared to a 14-day calendar-based application schedule): a 10% reduction was documented where the BMP mowing height (0.125 inches) and non-BMP N rate (2 lb N 1000 ft-2 yr-1) was implemented; a 50% reduction where a BMP N (4 lb N 1000 ft-2 yr-1; i.e., more vigorous turf that is better able to resist infection) and non-BMP mowing (0.09 in) regime was used; and an 80% reduction in fungicide applications with a combination of BMP N and BMP mowing heights. In addition, when BMP N fertility and BMP mowing practices were followed, acceptable disease control (<10% turf area infected) was achieved at fungicide rates as low as 50% of label rate during 2013. During the past two years (2012-2013), the macronutrient potassium has been shown to significantly reduce anthracnose disease severity compared to turf not receiving potassium applications in research trials at Rutgers University, a finding that may further reduce turf managers reliance on fungicides to control this disease. In summary, implementation of our BMPs by practitioners has resulted in improved management practices that are sustainable, cost-effective, and have provided improved control of anthracnose often with reduced pesticide inputs (reduced rates and few fungicide applications). This multi-state research project has also improved the exchange of information about anthracnose between turfgrass scientists and practitioners throughout North America, and has greatly enhanced our understanding of the general biology and ecology of this disease on golf course putting greens.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #10

1. Outcome Measures

Long Term - Turfgrass Breeding and Evaluation - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.

2. Associated Institution Types

- 1862 Extension
- 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)
Turfgrass Breeding and Evaluation

The turfgrass industry is important to the residents of New Jersey and surrounding states. There is more turfgrass growing within a 100 mile radius of New Brunswick, NJ than anywhere in the world. In a 2003 survey, there were over 860,000 acres in turf in
New Jersey with a value of over 1.5 billion dollars (Govindasany et al., 2005). Quality turf beautifies and enhances an environment, conserves soil, reduces pollution and provides a site for recreation. The development and use of new improved cultivars continues to be the greatest need in the turfgrass industry.

What has been done
NJAES Researchers, faculty and staff evaluate. utilize, enhance and preserve turfgrass germplasm and useful endophytes from the USA, Europe and North Africa. Emphasis is on collecting sources of Kentucky and Texas bluegrasses, tall fescue, perennial ryegrass, fine fescues, colonial, creeping and velvet bentgrasses and orchardgrass. Developed more effective breeding and evaluation techniques with emphasis on evaluation of single clonal mowed space plants and seeded single replicated turf plots in open-sun environments. All of these species were tested under worn and unworn conditions. A new emphasis was placed on the genetic control of different growth habits in tall fescue and breeding for drought tolerance in tall fescue.
Researched breeding for brown patch resistance in tall fescue and on hybridization of Kentucky bluegrass and Kentucky x Texas bluegrasses with new winter active European sources and breeding for disease resistance for rust in Kentucky bluegrass, dollar spot and red thread in fine fescue and red thread dollar spot, gray leaf spot and summer leaf spot in perennial ryegrass.

Demonstrated the usefulness of these techniques in the development and release of improved germplasm and cultivars. Educate students and stakeholders. Publish and disseminate information. Maintain and monitor cultivars developed at the New Jersey Agriculture Experiment Station to continue the assurance of quality seed. To reduce pesticide, fertilizer and water requirements to maintain 100% turf cover cool-season turfgrass.

Results
Over 40 new cultivar and germplasm agreements were executed in 2013 with turfgrass seed organizations. Eighteen new varieties were increased and named in
2013. During 2013, there were 21 U.S. Plant Variety Protection (PVP) Applications made and 29 U.S. PVP certificates were issued. Turfgrass cultivars from the Rutgers turfgrass breeding program represented over 90% of the top 30 cultivars in the (NTEP) National Turfgrass Evaluation Trials for tall fescues, fine fescues, and perennial ryegrasses. More than fifty percent of the top 25 cultivars in the 2005 and 2010 NTEP Kentucky bluegrass trials were from Rutgers. All of the highly resistant gray leaf spot varieties of perennial ryegrass in 2013 were from Rutgers. More than 50% of the NTEP top creeping, velvet and colonial bentgrasses were from Rutgers. In 2013, over 11,588 new turfgrass plots were established with over 108,784 plants in spaced-plant nurseries and 10,000 mowed single clone selections. In 2013, there were over 224,000 Kentucky bluegrass hybrids screened. The progenies of 180 new hybrid Kentucky bluegrasses were screened in spaced plant nurseries to determine apomixes levels and seed production. In the winter of 2012-2013, 20,000 tall fescue plants were screened for tiller and rhizome production. There were 50,000 perennial ryegrasses and 28,000 fine fescues screened in the winter of 2012-2013.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #11

1. Outcome Measures

Long Term - Breeding and Germplasm Enhancement for New Jersey Cranberry and Blueberry Industries - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.

2. Associated Institution Types

- 1862 Extension
- 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)
Breeding and Germplasm Enhancement for New Jersey Cranberry and Blueberry Industries

New Jersey is a major producer of both cranberries and blueberries with a current total industry crop value of over $111 million per annum. Since 2010, there are approximately 7,900 acres of blueberry and 3,200 acres of cranberry production in the state.
Both crops can suffer major yield losses due to insects, disease, and adverse climatic conditions. Critical pesticides currently employed by the blueberry and cranberry industries may be restricted or have loss of label in the near future, making alternative approaches essential for the sustainability of these two industries.

What has been done
NJAES Researchers? focus was towards increasing production efficiency due to the fluctuation of cranberry prices in recent years, and developing cultivars with increased resistance to the fruit rot disease complex. Classical plant breeding procedures, breeding and selections cycles, was followed for both blueberry and cranberry, involving identification of prepotent parents, crosses for trait complementation and enhancement, and selection for adaptation, productivity, fruit quality, etc. The major impact of this program was the development of cranberry and blueberry cultivars better adapted to a warmer climate thereby enhancing reliable production and economic sustainability, environmental compatibility, and 'value-added' nutrition. Research results and implications were presented at scientific meetings including North American Cranberry Research & Extension Workers, American Chemical Society, and American Phytopathological Society. In an effort to educate growers and extension personnel, presentations were made to several hundred growers at meetings and Field Days in New Jersey, Washington, Oregon, Quebec and British Columbia. Outreach activities included providing cultivar information to numerous blueberry and/or cranberry growers. In addition, tours were regularly provided to primary school students and their teachers to learn about cranberry and blueberry production, IPM, the impact of fruit rot, and plant breeding.

Results
Overall, 3% of the progeny were highly resistant, while 50% were highly susceptible. A few progeny were identified with both good yield and FFRR. The top 10 progeny had a 3-yr mean percent rotten fruit of 35% or less, while the most resistant progeny had a 3-yr mean percent rot of only 16%, compared to 87% rotten fruit in Stevens, the industry standard. Nicholi Vorsa, director of the NJAES Marucci Center, was named a 2013 NJ Investor of the Year by the New Jersey Inventors Hall of Fame for his scientific research and monumental contributions to disease-resistant cranberries and the cranberry industry.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #12

1. Outcome Measures

Long Term - Conservation and Utilization of Plant Genetic Resources - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.

2. Associated Institution Types

- 1862 Extension
- 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)
Conservation and Utilization of Plant Genetic Resources

All tree fruit cultivars have defects which reduce fruit quality, marketable yields and/or their ornamental value. Susceptibility to bacterial diseases, small size, lack of fruit firmness, inability for the fruit to store, poor fruit color, and lack of flower bud hardiness are common drawbacks of currently available varieties.

What has been done
NJAES research lead to the identification of new sources of genetic diversity to develop peach, apricot, and apple cultivars which will be better adapted to northeastern growing conditions. We have continued to acquire and characterize Prunus and Malus plant genetic resources for its potential use in plant breeding programs in the Northeast, elsewhere in the US, and other similar temperate environments in Europe, North Africa, South America, Australia and New Zealand. Annually, accessions and elite selections were evaluated for hardiness, bloom date, flower bud set, crop load, fruit size and weight, fruit quality, fruit firmness and disease resistance.

Quantitative and qualitative information about each accession/selection was entered into a database, analyzed, and compiled into reports that are disseminated to researchers, nurserymen, and grower cooperators. The apricot (Prunus armeniaca L.) breeding program focused on the development apricots with improved eating quality and a broader range of adaption. The focus of our peach and nectarine [Prunus persica (L.) Batsch] crosses was to develop cultivars with large, firm fruit that soften slowly, and are tolerant to bacterial spot (Xanthomonas campestris pv. pruni). The apple (Malus Xdomestica Borkh.) breeding program was to develop high quality desert apples with durable resistance to apple scab (Venturia inaequalis). Information about this research and new varieties that are developed is disseminated by presentations at grower meetings, variety showcases, newspaper articles, publications in professional journals, and published patents.

Results

The consistent development of a steady stream of new and improved tree fruit varieties is critically important to our long-term agricultural competitiveness. As a result of this research, many peach, apricot, and apple selections have been distributed to researchers, growers, and nurserymen for further testing. Several of these selections were determined to be superior to the cultivars that are currently being grown, and the decision was made that they should be commercialized. Consequently, patent applications were filed on one apricot, three peach, and one nectarine selection(s), and patents issued on five peach, one nectarine, and one apple selection(s). Information about these new and improved tree fruit varieties was disseminated during presentations at grower meetings, variety showcases, newspaper articles, publications in professional journals, and published patents.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #13

1. Outcome Measures

Long Term - Integrating Crop Pollination by Native Bees into Agricultural Pollination Management and Maintaining Native Pollinators and their Habitats - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.

2. Associated Institution Types

- 1862 Extension
- 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)
Integrating Crop Pollination by Native Bees into Agricultural Pollination Management and Maintaining Native Pollinators and their Habitats

Little information exists about the habitat needs of most pollinators, and in particular, about how they are affected by increasing human land uses such as agricultural intensification and suburban/urban development (Aizen and Feinsinger 2003; Cane 2001; Winfree et al. In preparation). New Jersey is so densely populated and has little remaining natural habitat, it is particularly important to maximize the effectiveness of the remaining natural areas by including pollinators in natural resource management.

What has been done
NJAES Researchers identified the habitat types and plant species most beneficial to pollinators in New Jersey, and will continue an ongoing collaboration with the Natural Resource Conservation Agency (NRCS) in New Jersey to provide research-based guidelines for pollinator-friendly land management practices.

Results
Researchers collected and identified 10,000 specimens of 100 pollinator species. We identified the plant species that were significantly preferred by pollinators. This work has resulted in multiple outreach publications in both print and web format and these have been utilized by the USDA-NRCS programs, the Xerces Society for Invertebrate Conservation, and by private landowners to effectively restore beneficial insects. Findings, crop pollination: We have generated very large (10,000 records) data sets on these projects. We found that native, wild pollinators contribute 20-63% of the total crop pollination, across different crops. The remainder of the pollination is contributed by honey bees. We have also used this work in multiple outreach publications in both print and web format and these have been utilized by the USDA-NRCS programs, the Xerces Society for Invertebrate Conservation. The result of this work was used as recommendations to the New Jersey NRCS for modifying buffer and riparian planting standards to incorporate important plants for pollinators. The NRCS plans to create buffer habitat on 5% (30,000 acres) of the agricultural area of New Jersey over the next ten years, and NJAES recommendations will be included in these plans, thus having a large and immediate impact on conservation of pollinators in the state.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

None to report.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

NJAES research and extension outcomes related to this planned program were evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we included the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys were used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we focused on program delivery, participation, relevance and timeliness. Data was collected at appropriate times for each initiative that supports this planned program. IRB approved evaluation instruments were used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstration were collected and analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions. See state defined outcomes for detailed results of each initiative.

Key Items of Evaluation

None to report.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Climate Change - Home, Garden 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
102	Soil, Plant, Water, Nutrient Relationships	20%		20%	
111	Conservation and Efficient Use of Water	20%		20%	
131	Alternative Uses of Land	20%		20%	
205	Plant Management Systems	20%		20%	
721	Insects and Other Pests Affecting Humans	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	3.2	0.0
Actual Paid Professional	22.2	0.0	4.6	0.0
Actual Volunteer	3948.0	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**
482345	0	433126	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1963389	0	1314254	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
325994	0	1382024	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Identify critical programmatic foci/needs based on Extension and stakeholder assessment broadly defined under two areas:

- Environmentally sound gardening/lawn care
- Home horticulture-lawn, garden and grounds management
- Commercial horticulture - professional management and maintenance
- Environmentally sound household, structural pest control
- Home pest control-termites, carpenter ants,, etc.
- Human-heath related pest control-bed bugs, mosquitoes, ticks, etc.
- A school IPM program will be developed to train end-users sound management techniques,

Develop an inventory of local (county based) and regional and statewide programs designed to meet these needs. Identify team members and their roles. Create a multi-task effort to generate and share research-based information with clientele, including research, demonstrations, educational meetings and workshops, certification programs, trainings, etc. Research on plant cultivars that exhibit increased disease ans insect resistance , as well as reduced need for fertilizer and irrigation water, will lead to reduced dependence on chemical control of pests and disease, lessening the impact on the environment.

2. Brief description of the target audience

Stakeholders:

- Homeowners and residential clientele
- Commercial horticulture professionals (management and maintenance)
- Commercial pest control operators
- Public health officials
- Local environmental commissions or others that have interest in these areas
- Municipalities and other governmental and non-governmental agencies, including Parks Commission, Public Health, Mosquito Commission, schools, etc.
- Volunteers (trained via Master Gardener Program, Environmental Stewards Program), youth and others who can support and benefit from these efforts
- Underserved and underrepresented audiences

3. How was eXtension used?

RCE faculty participated in Animal Wast Management CoP. Answered ask the expert quesrions and developed collaborative educational products.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	41448	5170	15069	14839

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	19	0	19

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications,publications. In addition a trained volunteer teaching base will be developed.Quantitative reports of participation data will be collected.

Year	Actual
2013	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Short Term - Increased knowledge and improved decision making skills of professionals and volunteers (Master Gardeners and Environmental Stewards) working in commercial horticulture professions (management and maintenance), commercial pest control operators, public health officials, municipalities and other governmental and non-governmental agencies. Increased number of trained youth and adult volunteers, and measurable impact of their assistance on clientele. Increased number of certified pest control operators. Increased number of youth and adult clientele utilizing Extension information and service to improve their own and others knowledge and decision making skills.
2	Medium Term - Educated youth and adult clientele, both professional and residential, utilize their newly gained knowledge and skills to implement and make changes such as: Efficient and effective pest control techniques. Proper utilization of fertilizers and other soil amendments as needed based on soil testing. Proper selection of plant materials to reduce need for chemical inputs. Reduction in the damage caused by structural pests. Reduction in health related incidents and costs association with human health vectors (ticks, mosquitoes). Protect health and safety of school children. Enhance or maintain environmental quality.
3	Long Term - New Jersey's residents will reside, work and play in a healthy, safe, and sound environment-in their homes, gardens, schools, parks and workplaces.
4	Medium Term - Animal Waste Management Program for New Jersey Livestock Producers - Educated youth and adult clientele, both professional and residential, utilize their newly gained knowledge and skills to implement and make changes such as: Efficient and effective pest control techniques. Proper utilization of fertilizers and other soil amendments as needed based on soil testing. Proper selection of plant materials to reduce need for chemical inputs. Reduction in the damage caused by structural pests. Reduction in health related incidents and costs association with human health vectors (ticks, mosquitoes). Protect health and safety of school children. Enhance or maintain environmental quality.
5	Long Term - The North Jersey Ornamental Horticulture Conference - New Jersey's residents will reside, work and play in a healthy, safe, and sound environment-in their homes, gardens, schools, parks and workplaces.
6	Long Term - Safe Practices for Urban Gardening Program - New Jersey's residents will reside, work and play in a healthy, safe, and sound environment-in their homes, gardens, schools, parks and workplaces.

Outcome #1

1. Outcome Measures

Short Term - Increased knowledge and improved decision making skills of professionals and volunteers (Master Gardeners and Environmental Stewards) working in commercial horticulture professions (management and maintenance), commercial pest control operators, public health officials, municipalities and other governmental and non-governmental agencies. Increased number of trained youth and adult volunteers, and measurable impact of their assistance on clientele. Increased number of certified pest control operators. Increased number of youth and adult clientele utilizing Extension information and service to improve their own and others knowledge and decision making skills.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Medium Term - Educated youth and adult clientele, both professional and residential, utilize their newly gained knowledge and skills to implement and make changes such as: Efficient and effective pest control techniques. Proper utilization of fertilizers and other soil amendments as needed based on soil testing. Proper selection of plant materials to reduce need for chemical inputs. Reduction in the damage caused by structural pests. Reduction in health related incidents and costs association with human health vectors (ticks, mosquitoes). Protect health and safety of school children. Enhance or maintain environmental quality.

2. Associated Institution Types

- 1862 Extension
- 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)
2013 PCO & Health Officers Day

Licensed pesticide applicators and public health officers are faced with new challenges each year when making decisions about how to control insects and animals that threaten human health. These professionals also are required to attend continuing education programs to remain current

in their profession and to maintain their licenses and/or certification.

What has been done
The PCO & Health Officers Day is an annual continuing education program for licensed pesticide operators, public and environmental health officers. Annually RCE brings together experts in household and indoor pest control, rodent control, rabies, an indoor environmental quality and animal control to lecture about the current best management practices in their fields. 2013 topics were: Wildlife Damage and Disease Issues in NJ; Rodent Control; Bedbug Biology and Control; Mosquito Control; and, Rabies in NJ.

Results
Participants were surveyed at the end of the workshop. 77% of participants had an increased understanding of human health issues associated with wildlife. 85% of participants stated they had improved their confidence in managing rodent populations. 87% stated they had a better understanding of bedbug biology and how to control bedbug infestations. 74% stated they had improved their knowledge of mosquito control techniques and strategies. 87% of participants stated they had learned important new information about rabies in NJ. 62% of participants believe that as a result of this training they will be applying less pesticides in the coming season.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
131	Alternative Uses of Land
205	Plant Management Systems
721	Insects and Other Pests Affecting Humans

Outcome #3

1. Outcome Measures

Long Term - New Jersey's residents will reside, work and play in a healthy, safe, and sound environment-in their homes, gardens, schools, parks and workplaces.

2. Associated Institution Types

- 1862 Extension
- 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)
Rutgers Environmental Stewards

Environmental issues are among the most serious problems faced statewide and nationally. A six year NJDEP study concluded in March 2003 on comparative risk from environmental stressors concluded that the top four environmental issues in New Jersey were 1.land use change, 2.indoor pollution, 3.invasive species and 4.outdoor air pollution.

What has been done
A RCE County Agricultural Agent provided leadership to the Rutgers Environmental Stewards. A structured volunteer training and management program focused on the environment to provide significant value-added to New Jersey. RCE formed a partnership with Duke Farms Foundation to create a statewide Environmental Stewardship certification program. Cooperators include the NJDEP, NJ Audubon, the Association of NJ Environmental Commissions, and a rapidly expanding list of environmentally related organizations from government, academia and the non-profit sector. An advisory council was formed to guide the Rutgers Environmental Stewards program which consisted of internal and external stakeholders. Regional instruction locations were established. As of 2013 regional classes have been conducted for nine years providing 1,260 hours of training to 352 students. To support promotion and management of the program a web site was created, http://envirostewards.Rutgers.edu. The site functions as both a promotional tool to attract students and serve them as an educational resource.

Results
The Rutgers Environmental Stewards is a long term program that entered its sixth year in 2013. Summary data presented included: 90.54% completed training, 49.87% engaged in an intern project, 31.27% completed an intern project, and 6.98% on environmental commissions. Impact summaries of work conducted by the 121 Rutgers Environmental Stewards who have attained certification in the program are available on-line at http://envirostewards.rutgers.edu/CertifiedRutgersEnvironmentalStewardsImpactsandProjects.ht

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
131	Alternative Uses of Land
205	Plant Management Systems
721	Insects and Other Pests Affecting Humans

Outcome #4

1. Outcome Measures

Medium Term - Animal Waste Management Program for New Jersey Livestock Producers - Educated youth and adult clientele, both professional and residential, utilize their newly gained knowledge and skills to implement and make changes such as: Efficient and effective pest control techniques. Proper utilization of fertilizers and other soil amendments as needed based on soil

testing. Proper selection of plant materials to reduce need for chemical inputs. Reduction in the damage caused by structural pests. Reduction in health related incidents and costs association with human health vectors (ticks, mosquitoes). Protect health and safety of school children. Enhance or maintain environmental quality.

2. Associated Institution Types

- 1862 Extension
- 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)
Animal Waste Management Program for New Jersey Livestock Producers

In New Jersey, in addition to playing an important role in the state?s economy, livestock animals help to maintain open, green spaces that add to the scenic beauty of the state. The land on which these animals are kept is often very valuable. To be good stewards of the land, farmers should manage their farms to minimize the potential for negative environmental impacts due to animal waste/manure.

What has been done
Rutgers Cooperative Extension faculty and staff participated in the development of the Animal Waste Management Rule developed by the New Jersey Department of Agriculture. This rule requires all New Jersey livestock farmers to comply with several requirements intended to improve manure and environmental management in order to protect water and environmental quality. The Animal Waste Management Program involved outreach to stakeholders, state and federal agents and producers, delivered via county extension offices including workshops, newsletter, mass media, posters and audio visual presentations. A nutrient management computer-program was developed for use by livestock producers in New Jersey. Rutgers Cooperative Extension staff, in a cooperative agreement with the USDA-NRCS, continues to write Comprehensive Nutrient Management Plans (CNMP?s). A CNMP ensures the beneficial utilization of manure and associated nutrients and includes the following components: nutrient management for the cropland, control of manure runoff from cropland fields, control of soil erosion, and pest management (weeds, insects, disease) related to crop production. A survey of 2,000 New Jersey horse farms in Burlington, Hunterdon, Monmouth, Salem, Somerset, and Sussex Counties has been completed. This survey of the horse industry was undertaken to determine how equine farmers handle, manage, and dispose of horse manure. A Near Infrared Reflectance (NIR) spectroscopy procedure for analyzing horse manure has been developed. This procedure should decrease cost and increase ease of completing horse manure analysis

and enable New Jersey horse producers to conveniently and economically sample horse manure. Nine Animal Waste Management factsheets have been published.

Results
Gold Medal Horse Farm impacts: Gold Medal winners represent the best in environmental stewardship on New Jersey Horse farms. These two farms not only serve as demonstration farms, but also show the importance of maintaining open space in New Jersey and how the equine industry plays a role. One has demonstrated superb environmental best management practices such as minimizing storm water run-off, establishing controls to reduce soil erosion, maintaining a low stocking density, and meticulous pasture care.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
131	Alternative Uses of Land
205	Plant Management Systems
721	Insects and Other Pests Affecting Humans

Outcome #5

1. Outcome Measures

Long Term - The North Jersey Ornamental Horticulture Conference - New Jersey's residents will reside, work and play in a healthy, safe, and sound environment-in their homes, gardens, schools, parks and workplaces.

2. Associated Institution Types

- 1862 Extension
- 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)
The North Jersey Ornamental Horticulture Conference

The landscape of NJ is comprised of 890,425 acres of turf, according to a 2001 Rutgers

University study of the turf industry. Turf makes up 19% of the state's total acreage. Golf Courses, commercial properties and residential neighborhoods create a demand for professional turf management services. Professional turf managers care for 39% of the turf acreage. The 2,442 service providers who maintain commercial and residential properties contribute $400 million dollars in payroll and benefits to the state?s economy. They also contribute $691 million in cash expenditures. This competitive industry needs to be apprised of university research on best turf management practices to distinguish themselves from competitors and minimize the use of pesticides and fertilizers thus protecting our natural resources.

What has been done
The North Jersey Ornamental Horticulture Conference (NJOHC) is organized by a team of RCE faculty and program coordinators to promote the adoption of integrated pest management (IPM) practices by industry professionals. Adoption of IPM practices will reduce the amount of fertilizers and pesticides used on residential, commercial and public properties. The three day conference consists of Turf Day, Tree Day and Landscape Day.

Results
On the program evaluation (N=77), 45 professionals indicated that they attended Turf Day, 32 attended Tree Day and 77 attended Landscape Day. Ninety-six percent (96%) of the professionals will make more informed pest management decisions as a result of attending the conference.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
131	Alternative Uses of Land
205	Plant Management Systems
721	Insects and Other Pests Affecting Humans

Outcome #6

1. Outcome Measures

Long Term - Safe Practices for Urban Gardening Program - New Jersey's residents will reside, work and play in a healthy, safe, and sound environment-in their homes, gardens, schools, parks and workplaces.

2. Associated Institution Types

- 1862 Extension
- 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)
Safe Practices for Urban Gardening Program

Health problems associated with lead exposure are well known and lead levels in New Brunswick children have decreased, many immigrants continue to garden directly in the soil and have little knowledge of the testing and soil abatement measures necessary to create safe gardening conditions. The availability of clean soil or methods for composting and creating safe soil is limited and more effort is necessary to provide culturally appropriate education to the largely Mexican community.

What has been done
Rutgers Cooperative Extension (RCE) of Middlesex County has partnered with a number of New Brunswick based community organizations including Unity Square Partnership and Elijah?s Promise to develop a Lead-Safe Backyard Gardening Program in the City of New Brunswick, which targets underserved, Spanish speaking residents of New Brunswick. ?Safe Practices for Urban Gardening? has been developed. The following teaching tools are included: development and implementation of ?Lead-Safe Backyard Gardening/ Jardinería Libre de Plomo en tu Patio? bilingual workshops. A bilingual manual for residents titled "Safe Soil: A Healthier Way to Garden? http://njaes.rutgers.edu/pubs/publication.asp?pid=E342. A 2 page bilingual letter has been developed explaining laboratory testing results, and best practices for avoiding lead exposure.

Results
Follow up surveys were conducted via phone to 58 Latino gardeners one year after workshops and demonstrations. 88% of respondents (n= 17) were able to correctly name or identify the sources of lead in urban soil (i.e. chipped paint, leaded gasoline); 60% had adopted at least one best practice to reduce their exposure to lead in the soil including adding clean compost to their yard, building raised beds, and/or wearing gloves when gardening; and 77% had shared the information with others.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
131	Alternative Uses of Land
205	Plant Management Systems
721	Insects and Other Pests Affecting Humans

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

None to report.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

NJAES research and extension outcomes related to this planned program were evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we included the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys were used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we focused on program delivery, participation, relevance and timeliness. Data was collected at appropriate times for each initiative that supports this planned program. IRB approved evaluation instruments were used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstration were collected and analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions. See state defined outcomes for detailed results of each initiative.

Key Items of Evaluation

None to report.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Global Food Security and Hunger - Integrated Pest Management

☑ 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
216	Integrated Pest Management Systems	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	25.0	0.0	13.0	0.0
Actual Paid Professional	19.1	0.0	4.3	0.0
Actual Volunteer	43.0	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
215551	0	775933	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1663484	0	1075269	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
81861	0	1768263	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research
- Develop new and novel techniques for pest management and pest detection

Delivery

- Provide IPM information to a wide variety of stakeholders
- Employ new methods for delivery IPM information

Education

- Conduct IPM educational programs for stakeholders
- Conduct IPM educational training for university students
- Conduct IPM educational training for Vo-Ag and FFA students
- Conduct IPM public awareness campaign

Extension

- Work with communities, schools, businesses to help them meet their regulatory responsibilities on pesticide application
- Help growers develop scouting programs to identify pest populations before significant plant damage occurs.
- Develop pest management options to be used in an integrated or rotational program.
- Identify indicators to help growers anticipate pest problems.
- Develop monitoring techniques and population damage thresholds for selected pests.
- Provide scientifically sound advice to state regulatory bodies on pest management and pesticide issues
- Create a multidisciplinary program comprising of faculty, staff, volunteers, industry partners and government officials
- Investigate IPM methods to help growers produce top quality crops, limiting or reducing production costs.
- Evaluate all pest and crop management practices into a set of commercially used methods. These include the use of: pesticides, economic/aesthetic threshold levels, resistant cultivars, optimum horticultural practices, environmental monitoring, pest scouting, and fertility monitoring and recommendations.

2. Brief description of the target audience

- Municipalities
- Pesticide applicators and their employers
- Commercial pesticide applicators
- State Dept. of Environmental Protection
- Staff and students who gain valuable scientific experience
- Industry partners in agriculture and related commodities
- Consumers
- NJAES Faculty and Staff involved in pest management research/outreach
- Farmers
- Commodity groups
- New Jersey residents
- School faculty, staff and children
- NJAES researchers
- Secondary and university students
- Governmental agencies
- Environmental organizations
- Agricultural, landscape, fine turf and other related industries

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	22332	4264	1321	1200

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

Patent Applications Submitted

Year: 2013

Actual: 1

Patents listed

2013-040

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	12	30	42

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications,publications. In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected

Year	Actual
2013	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Short Term - Develop improved IPM delivery methods. Develop detection, monitoring and sampling methods that reliably predict pest levels. Develop novel management methods for a wide variety of pests. Develop IPM training for secondary and university students. Improve public awareness about IPM Determine the effectiveness of pheromones for mating disruption of pests. Greater understanding of entomopathogenic nematode species'effects on pests. Evaluation of the effectiveness of natural pesticides and crop management to reduce pests. Determine which types of plants attract pests to be used as a pest control method.
2	Medium Term - Research and educational programs, and public awareness campaign results in increased adoption of IPM in traditional and non-traditional systems. Research findings used to develop new projects. IPM training of students creates new IPM interns, professionals and researchers. Knowledge of various natural insecticides and their effectiveness on pests. Determining the best time and application method for IPM products. Greater understanding of pest biology and ecology. Greater understanding of entomopathogenic species biology and ecology.
3	Long Term - Protect commodities, homes and communities from pests. Increased abundance of high quality food and fiber products. Increased acreage in New Jersey grown under IPM practices. Reduced environmental problems associated with current pest management practices. A comprehensive understanding of best management practices for IPM that are economically viable and environmentally safe.
4	Medium Term - Upland Fruit (Tree Fruit and Grape) Integrated Pest Management (IPM) Delivery - Research and educational programs, and public awareness campaign results in increased adoption of IPM in traditional and non-traditional systems. Research findings used to develop new projects. IPM training of students creates new IPM interns, professionals and researchers. Knowledge of various natural insecticides and their effectiveness on pests. Determining the best time and application method for IPM products. Greater understanding of pest biology and ecology. Greater understanding of entomopathogenic species biology and ecology.
5	Medium Term - Weed Control in Cranberries - Research and educational programs, and public awareness campaign results in increased adoption of IPM in traditional and non-traditional systems. Research findings used to develop new projects. IPM training of students creates new IPM interns, professionals and researchers. Knowledge of various natural insecticides and their effectiveness on pests. Determining the best time and application method for IPM products. Greater understanding of pest biology and ecology. Greater understanding of entomopathogenic species biology and ecology.
6	Medium Term - Improving Sustainability, Efficiency, and Efficacy of Peach Disease Management Strategies: Biofungicides, Conventional Fungicides, and Abiotic Environmental Factors - Research and educational programs, and public awareness campaign results in increased adoption of IPM in traditional and non-traditional systems. Research findings used to develop new projects. IPM training of students creates new IPM interns, professionals and researchers. Knowledge of various natural insecticides and their effectiveness on pests. Determining the best time and application method for IPM products. Greater understanding of pest biology and ecology. Greater understanding of entomopathogenic species biology and ecology.
7	Medium Term - Blueberry and Cranberry Insect Pest Management - Towards the Development and Implementation of Reduced-Risk Strategies - Research and educational programs, and public awareness campaign results in increased adoption of IPM in traditional

	and non-traditional systems. Research findings used to develop new projects. IPM training of students creates new IPM interns, professionals and researchers. Knowledge of various natural insecticides and their effectiveness on pests. Determining the best time and application method for IPM products. Greater understanding of pest biology and ecology. Greater understanding of entomopathogenic species biology and ecology.
8	Long Term - Developing and Implementing Integrated Pest Management Strategies in Urban Communities - Protect commodities, homes and communities from pests. Increased abundance of high quality food and fiber products. Increased acreage in New Jersey grown under IPM practices. Reduced environmental problems associated with current pest management practices. A comprehensive understanding of best management practices for IPM that are economically viable and environmentally safe.

Outcome #1

1. Outcome Measures

Short Term - Develop improved IPM delivery methods. Develop detection, monitoring and sampling methods that reliably predict pest levels. Develop novel management methods for a wide variety of pests. Develop IPM training for secondary and university students. Improve public awareness about IPM Determine the effectiveness of pheromones for mating disruption of pests. Greater understanding of entomopathogenic nematode species'effects on pests. Evaluation of the effectiveness of natural pesticides and crop management to reduce pests. Determine which types of plants attract pests to be used as a pest control method.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Medium Term - Research and educational programs, and public awareness campaign results in increased adoption of IPM in traditional and non-traditional systems. Research findings used to develop new projects. IPM training of students creates new IPM interns, professionals and researchers. Knowledge of various natural insecticides and their effectiveness on pests. Determining the best time and application method for IPM products. Greater understanding of pest biology and ecology. Greater understanding of entomopathogenic species biology and ecology.

2. Associated Institution Types

- 1862 Extension
- 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)
Blueberry Integrated Pest Management Delivery

Blueberries are a unique agricultural commodity, since they are one of only several native foods in commercial production in the US. In New Jersey most blueberries are grown in the ecologically sensitive ?New Jersey Pinelands?, which is characterized by porous soils with high water tables, which are subject to vertical movement of a number of agricultural chemicals. Over 40 different insect and disease pests can attack highbush blueberries, including 2 new invasive pests, the brown marmorated stink bug, and the spotted wing drosophila. Pest management costs continue to increase. The Food Quality Protection Act has led to restrictions and changes in the types of pesticides that may be used to produce blueberries. Many of the new pesticides are narrow spectrum, that control only one or a few pests and must be used with degree day phenology models and other integrated pest management (IPM) practices.

What has been done
An integrated pest management (IPM) program was delivered to commercial blueberry growers. The program employed seasonal field scouts who collected weekly pest management data. The program reached all blueberry growers in New Jersey, but collected farm specific data on those farms participating in the scouting program. Results of scouting data were summarized in 2 statewide newsletters (The Blueberry Bulletin and The Plant & Pest Advisory-Fruit Edition ?Now on a Web Blog format). Results were also transferred to growers with farm visits, seasonal update meetings, and a broadcast fax system.

Results
Growers were educated, by RCE Agricultural faculty and professional staff, about novel management methods for a variety of pests in blueberries. Pesticide use for OP and carbamate pesticides was reduced. Using the results from a previous USDA/RAMP project, growers following this program had between 45% and 58% lower amounts of insecticide active ingredient applied than those grown using grower standard programs, with even greater reductions in the total amount of insecticide residue detected on leaves and fruit at harvest. Overall, growers who practiced IPM at high levels, used from 6-8 lb ai of pesticide per acre, while growers treating on a pure calendar schedule, used up to 34 lb ai per acre. Growers minimized on farm pest management costs. Some growers spent as much as $240/A for pesticides while the average IPM participant spent $132/A. The average grower using IPM practices saved about $100/A. New pest management practices such as mating disruption and whole farm GIS based monitoring were used. Small plot research/demonstration trials for Oriental beetle mating disruption continued to show that Oriental beetle could be managed with mating disruption in place of soil applied insecticide. Based on RCE research and demonstration work, a registration package is now finished, and commercial use started in 2013. In 2012, the spotted wing drosophila developed as a serious invasive pest in blueberries nationwide. While this is a serious threat to IPM programming, we made adjustments in 2013 to help protect the blueberry industry while minimizing conventional OP and carbamate insecticide use. While non-managed fields showed over 650 maggots per qt of berries, no fruit rejections were reported by IPM participants.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #3

1. Outcome Measures

Long Term - Protect commodities, homes and communities from pests. Increased abundance of high quality food and fiber products. Increased acreage in New Jersey grown under IPM practices. Reduced environmental problems associated with current pest management practices. A comprehensive understanding of best management practices for IPM that are economically viable and environmentally safe.

2. Associated Institution Types

- 1862 Extension
- 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)
Integrated Pest Management/Pesticide Safety Education

Pesticide Education and Safety Program (PESP): In New Jersey there are 15,000+ certified applicators registered with the New Jersey Department of Environmental Protection (NJDEP) - Pesticide Control Program. Approximately 3,000 are private applicators. To remain certified New Jersey law requires that private and commercial applicators accumulate at least 12 hours of recertification training divided between CORE (4) and CATEGORY (8) classifications during a five-year period. Integrated Pest Management Program (IPM): the IPM programs coordinated by Rutgers Cooperative Extension encompassed production agriculture in the areas of blueberries, nurseries, greenhouses, tree fruit, and vegetables.

What has been done
PESP: Approximately 30,000 applicators were recertified by this program in 2013. In addition, New Jersey initially certifies an average of 2,000 commercial applicators each year. New Jersey's PESP program currently utilizes 24 different manuals to provide initial training to both private and commercial applicators. This program also offered initial CORE training sessions in English and Spanish for commercial operators and applicators and provided training to school employees and master gardeners so they understand the proper use of pesticides and the issues surrounding their use. IPM: Work was done to develop management strategies for use against the brown marmorated stink bug in vegetables and tree fruit. In addition, the vegetable IPM program was able to impact more acreage through the use of their website that tracks weekly European corn borer and corn earworm population changes in the state. Overall, IPM adoption in

the state was seen on 7,400 acres of blueberries, 508 acres of nursery stock, 10 greenhouse acres, 8,604 acres of peaches, 2,527 acres of apples, 113 acres of peaches and 27,500 acres in vegetables (carrots, cole crops, high-tunnel tomato production, pumpkins, peppers, snap beans, staked tomatoes, sweet corn, and sweet potatoes) for a total of 66,662 acres.

Results

PESP: As a result of the program, several thousand private pesticide applicators, and commercial pesticide applicators and operators were provided with basic information that allowed them to conduct their jobs in a safe manner. In addition, information and training provided by this program gave growers and other applicators the skill set necessary to successfully complete their state pesticide licensing exams. In doing so, the application of pesticide in the state is a safer operation that is being done in a manner that does not create a hazard to applicators, workers or the general public. IPM: As a result of this program, benefits were seen in the areas of fruit, greenhouse, nursery and vegetable production systems. The various programs were able to document the following benefits: Pesticide use in tree fruit was reduced between 50 to 80% for Oriental fruit moth control. Growers in the vegetable IPM program received more timely information that resulted in less pesticide use, Nursery growers were better able to predict pest outbreaks and more effectively manage these outbreaks, Greenhouse growers were better able to manage pests and reduce insecticide and fungicide use because of the scouting program provided by the greenhouse IPM program. The impact of BMSB in tree fruit and peppers was also documented.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #4

1. Outcome Measures

Medium Term - Upland Fruit (Tree Fruit and Grape) Integrated Pest Management (IPM) Delivery - Research and educational programs, and public awareness campaign results in increased adoption of IPM in traditional and non-traditional systems. Research findings used to develop new projects. IPM training of students creates new IPM interns, professionals and researchers. Knowledge of various natural insecticides and their effectiveness on pests. Determining the best time and application method for IPM products. Greater understanding of pest biology and ecology. Greater understanding of entomopathogenic species biology and ecology.

2. Associated Institution Types

- 1862 Extension
- 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)
Upland Fruit (Tree Fruit and Grape) Integrated Pest Management (IPM) Delivery

New Jersey tree fruit production is located in both southern and northern counties. According to the latest agricultural statistics, NJ peach production is valued at $39.6 million and apples at $28.5 million. The industry in southern counties is heavily oriented towards wholesale markets and peach production, while the industry in northern counties is heavily dependent on direct markets and apple production. Retail market fruit production in northern counties is valued at approx. $12-15 million. New Jersey fruit growers produce commodities that are susceptible to more than two dozen arthropod and disease pests. Management of this pest complex can cost producers up to $500 or more per acre. New invasive species such as the brown marmorated stink bug (BMSB) and the spotted wing drosophila will demand changes in pest management practices and educational and research needs on a regional basis.

What has been done
An integrated crop management (ICM) program was delivered to commercial fruit growers who produced apples, peaches, nectarines, and grapes by RCE Agricultural faculty and professional staff. Secondary participants attend extension update meetings, and receive other IPM/ICM information through personal visits, fax broadcasts, articles, newsletters and the Internet. Primary participants are those growers who access all the above information and participate in a field scouting program. Organized grower meeting contact reached a total of 784 audience members, while on-farm consultations totaled 1,238 visits. The Plant and Pest Advisory Newsletter was changed to a blog format on the Web. A total of 32 weekly articles were written in that format, with a total circulation of 181 subscribers in NJ and other states. Acreage impacted by primary participants totaled 80% of all state tree fruit acreage. Over 95% of total state tree fruit acreage was impacted by the program. IPM information reached over 90% of NJ grape growers.

Results
The program demonstrated reduced risk methods that included the use of mating disruption and ground cover management as tools to replace insecticide use for Oriental fruit moth, tarnished plant bug and stink bugs and two species of peach tree borers. In southern counties, where the bulk of commercial peaches are produced, 75% of growers used alternative, ?reduced risk? insecticides, and 80% of growers used reduced risk fungicides. In total, program participants reduced pesticide use by 26-80% compared to standard spray schedules, depending on the practices used. Other IPM practices included grower use of degree day based pest models, reducing insecticide use by 40% compared to standard calendar spray methods. Laboratory tests where completed in 2013 as part of the fertility component. Over 75% of areas sampled were shown have sufficient to excessive phosphorous levels, which led to decreased phosphorous use on those sites. A trial project conducted in 2012 and repeated in 2013, demonstrated that growers could treat field edges while using mating disruption and ground cover management to reduce insecticide use by up to 75% compared to most commercial practices now being used for BMSB.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #5

1. Outcome Measures

Medium Term - Weed Control in Cranberries - Research and educational programs, and public awareness campaign results in increased adoption of IPM in traditional and non-traditional systems. Research findings used to develop new projects. IPM training of students creates new IPM interns, professionals and researchers. Knowledge of various natural insecticides and their effectiveness on pests. Determining the best time and application method for IPM products. Greater understanding of pest biology and ecology. Greater understanding of entomopathogenic species biology and ecology.

2. Associated Institution Types

- 1862 Extension
- 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)
Weed Control in Cranberries

Weeds, particularly perennials, are difficult to control in cranberry bogs. Clopyralid is a new herbicide that has been registered for use and is being used for weed control in cranberries. In recent years, pronamide, marketed under the trade name of Kerb, has been used for dodder control with section 18 Emergency Exemptions. Pronamide will no longer be available for the control of dodder in cranberries. Research to identify alternative dodder control measures is a priority.

What has been done
RCE Extension Specialist integrated effective herbicides into the current cranberry practices to improve the control of yellow loosestrife, sedges, and other weeds, prevent crop phytotoxicity, and maintain the longest practical preharvest interval. Evaluated the phytotoxicity and efficacy herbicides with the potential to control dodder and other serious weeds in cranberries. Screened herbicides registered on other crops and experimental herbicides for phytotoxicity to cranberries.

Evaluated herbicides on newly planted cranberry beds. Developed support for registration from the manufacturer(s) of herbicides with good potential for safely controlling weeds in cranberries, and cooperated with IR-4, the herbicide manufacturers, and state and federal agencies to obtain registration for herbicides, including BAS 514 and DPX 6025 that are not phytotoxic to the crop, control troublesome weeds, and are environmentally and toxicologically safe.

Results

Herbicides, including indaziflam and two formulations of diclobenil, were evaluated for crop safety and efficacy for the control of redroot in cranberries. Indaziflam injured cranberries in past studies when applied during active growth, but the herbicide did not injure cranberries when applied in early spring soon after the winter flood was removed. Results in 2013 confirmed that indaziflam could be applied to cranberries safely in early spring, and is important since indaziflam has been shown to control dodder. Growers have also expressed interest in using the new liquid formulation of diclobenil instead of the older labeled 4G (granular) formulation. Results in 2013 again confirmed previous research that indicated that the liquid diclobenil formulation is not as safe as the 4G formulation on cranberries. In addition, the liquid formulation was less effective controlling redroot than the granular formulation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #6

1. Outcome Measures

Medium Term - Improving Sustainability, Efficiency, and Efficacy of Peach Disease Management Strategies: Biofungicides, Conventional Fungicides, and Abiotic Environmental Factors - Research and educational programs, and public awareness campaign results in increased adoption of IPM in traditional and non-traditional systems. Research findings used to develop new projects. IPM training of students creates new IPM interns, professionals and researchers. Knowledge of various natural insecticides and their effectiveness on pests. Determining the best time and application method for IPM products. Greater understanding of pest biology and ecology. Greater understanding of entomopathogenic species biology and ecology.

2. Associated Institution Types

- 1862 Extension
- 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)
Improving Sustainability, Efficiency, and Efficacy of Peach Disease Management Strategies: Biofungicides, Conventional Fungicides, and Abiotic Environmental Factors

Major diseases on peach and nectarine include brown rot blossom blight and fruit rot, scab, and bacterial spot. Each of these diseases, if not effectively controlled, alone can cause 100% crop loss when pathogen inoculum levels and environmental conditions are favorable for disease development. Other diseases, such as rusty spot and constriction canker can also contribute to significant yield loss if not managed properly. Unfortunately, disease-resistant cultivars are not commercially available for most peach and nectarine diseases.

What has been done
RCE Extension Specialist evaluated the efficacy of
biofungicides for management of peach diseases and their integration into current disease control programs, with particular emphasis on brown rot and rusty spot, determined the ability of new fungicides to control pathogen growth during different phases of the disease cycle to allow more effective deployment in peach disease control programs, examined the influence of environmental factors on various components of the disease cycle for peach pathogens, with particular emphasis on peach scab.

Results
Blossom blight incidence has been increasing in recent years, possibly due to warmer winters and springs as a result of climate change. In 2013, several conventional fungicides only labeled for early season usage, including two formulations of iprodione, were shown to provide 85-87% control of the blossom blight phase of brown rot under heavy disease pressure. Since the chemistries of these materials are different than those used for later season brown rot control, their usage 'up front' provides an important strategy for fungicide resistance management. In contrast, the older protectants captan and chlorothalonil were not effective, yielding only 40-51% control of blossom blight. Thus, their use for early season disease control/resistance management should be limited.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #7

1. Outcome Measures

Medium Term - Blueberry and Cranberry Insect Pest Management - Towards the Development and Implementation of Reduced-Risk Strategies - Research and educational programs, and public awareness campaign results in increased adoption of IPM in traditional and non-traditional systems. Research findings used to develop new projects. IPM training of students creates new IPM interns, professionals and researchers. Knowledge of various natural insecticides and their effectiveness on pests. Determining the best time and application method for IPM products. Greater understanding of pest biology and ecology. Greater understanding of entomopathogenic species biology and ecology.

2. Associated Institution Types

- 1862 Extension
- 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)
Blueberry and Cranberry Insect Pest Management - Towards the Development and Implementation of Reduced-Risk Strategies

The blueberry and cranberry industry in New Jersey suffers major yield losses due to insect pests. Growers rely heavily on insecticides to manage pest problems.

What has been done
The Blueberry/Cranberry Entomology Program at Rutgers University directed by Extension Specialist focuses on the development and implementation of cost-effective reduced-risk insect pest management practices in blueberries and cranberries and the dissemination of this information to blueberry and cranberry growers. Several methods of information transfer including annual grower meetings, field days, twilight meetings, newsletters, and electronic media are used to serve the blueberry and cranberry industry in New Jersey. The research program also delivered presentations at meetings to the scientific community.

Results
The results of the research and outreach lead to the following outcomes: developed and implemented new tools for monitoring insect pest populations in blueberries and cranberries, worked with IR-4 on the registration of new insecticides in blueberries and cranberries, evaluated, implemented, and promoted adoption of new reduced-risk strategies for insect control in blueberries and cranberries, and delivered presentations to more than 100 New Jersey blueberry and cranberry growers on the use of new insect pest management practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

Outcome #8

1. Outcome Measures

Long Term - Developing and Implementing Integrated Pest Management Strategies in Urban Communities - Protect commodities, homes and communities from pests. Increased abundance of high quality food and fiber products. Increased acreage in New Jersey grown under IPM practices. Reduced environmental problems associated with current pest management practices. A comprehensive understanding of best management practices for IPM that are economically viable and environmentally safe.

2. Associated Institution Types

- 1862 Extension
- 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)
Developing and Implementing Integrated Pest Management Strategies in Urban Communities

Urban pests such as termites, bed bugs, cockroaches, ants, flies, ticks, rodents, etc. cause billions of dollars of commodity loss, structural damage, and a number of diseases. They are also nuisance pests when they enter homes. In a recent survey at Irvington, New Jersey, we found 45% of the apartments in a low-income community had bed bugs. Pesticide applications for controlling urban pests pollute the environments, pose health risks to human and pets, and lead to insecticide resistance development. The public needs more effective, environmentally safe methods to reduce pests and pesticide use, and minimize health risks associated with pesticide applications.

What has been done
RCE Extension Specialist collaborated with three Housing Authorities in implementing community-wide bed bug management programs. The bed bug infestations will be monitored every 6 months for 18 months period. Bed bug control strategies will be revised. A community-wide bed bug management program that was initiated in 2012 was finished in October. Final results were presented at the annual meeting of the Entomological Society of America in November 2013. A manuscript was prepared and will be submitted in February 2014. Developed a 6 minutes video on a do-it-yourself bed bug monitor. It was posted at: http://www.youtube.com/watch?v=JbNn74Mt8XQ. Laboratory research found that only two of the 11 products evaluated were useful for controlling bed bugs. Additional studies revealed that the

essential oil-based products is related to the formulation. Found that efficacy of the insecticides is affected by feeding activities of bed bugs. These results suggest that current product testing methods must be revised. The information is useful to both manufacturers and consumers.

Results

A case study at New Brunswick Housing Authority showed a bed bug management program in 9 apartments resulted in 97% reduction in bed bug numbers and 96% reduction in pesticide use after 6 months. Implementing a bed bug management program at Jersey City Housing Authority (358 apartments) reduced bed bug infestation from 15% to 2% after one year and reduced pesticide use by > 90% compared to conventional treatment methods.

A home-made bed bug monitor using sugar, yeast, and dog bowls was developed. Field evaluations show that it is highly effective in detecting bed bugs. It is at least 15 times cheaper than the comparable commercial bed bug monitor. Residents and building managers are more aware of the use of non-chemical methods for preventing and controlling bed bugs. These methods include de-cluttering, frequent laundering of bed linens, installing mattress encasements, avoid taking used furniture from the streets, etc.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

NJAES research and extension outcomes related to this planned program were evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we included the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys were used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we focused on program delivery, participation, relevance and timeliness. Data was collected at appropriate times for each initiative that supports this planned program. IRB approved evaluation

instruments were used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstration were collected and analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions. See state defined outcomes for detailed results of each initiative.

Key Items of Evaluation

None to report.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Global Food Security and Hunger - Aquaculture

☑ 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
135	Aquatic and Terrestrial Wildlife	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	4.8	0.0
Actual Paid Professional	5.9	0.0	3.3	0.0
Actual Volunteer	798.0	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
35808	0	162351	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
506426	0	937896	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
120331	0	546033	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

• Investigate the genetic mechanisms for disease resistance and improved quality in economically important shellfish

• Create a dynamic and cooperative partnership with faculty, staff, businesses, regulatory/advisory

councils and the government to research best management practices and discover effective solutions and management practices to address threats to NJ aquaculture as well as investigate opportunities to increase the quality and quantity of the aquaculture harvest.

- Collect and analyze data on how communities and businesses are affected by the aquaculture industry management practices.
- Examine the presence of unhealthy levels of contaminants in aquaculture products.
- Determine best techniques for shellfish hatcheries on and off shore.

2. Brief description of the target audience

- Aquaculture related businesses and employees
- State Department of Environmental Protection
- State Department of Agriculture
- Industry partners who learn ways to improve or protect their harvests
- Communities who depend on aquaculture-related revenue
- NJAES faculty and staff involved in water research/outreach
- Consumers of aquaculture products, including recreational fishing

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	18027	6670	1500	6550

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	2	20	22

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications,publications. In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected.

Year	Actual
2013	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Short Term - Knowledge of seasonal variations for shellfish diseases. Create census data on communities involved in aquaculture. Determine the level of pollutants in economically important fish species. Develop markers and maps of important genetic traits. Knowledge of shellfish hatchery techniques that decrease time for growth to market size.
2	Medium Term - Identify spatial and temporal relationships between patterns of shellfish diseases in NJ and environmental correlates. To develop disease-resistant strains of shellfish. Develop superior disease-resistant and larger genetic lines of shellfish.Measure the impact of communities on the aquaculture industry. Knowledge of the feasibility of off-shore shellfish farming.
3	Long Term - Clear and comprehensive understanding of community, environmental, genetic and physical regulators of aquaculture quality and quantity. A safe and secure aquaculture industry that can meet consumer demands for high-quality products and also be environment friendly and economically viable. Creation of superior aquaculture products that will be of high demand outside NJ.
4	Medium Term - Collaborative Fisheries Research - Identify spatial and temporal relationships between patterns of shellfish diseases in NJ and environmental correlates. To develop disease-resistant strains of shellfish. Develop superior disease-resistant and larger genetic lines of shellfish.Measure the impact of communities on the aquaculture industry. Knowledge of the feasibility of off-shore shellfish farming.
5	Long Term - Shellfish Genetics and Breeding for Aquaculture - Clear and comprehensive understanding of community, environmental, genetic and physical regulators of aquaculture quality and quantity. A safe and secure aquaculture industry that can meet consumer demands for high-quality products and also be environment friendly and economically viable. Creation of superior aquaculture products that will be of high demand outside NJ.

Outcome #1

1. Outcome Measures

Short Term - Knowledge of seasonal variations for shellfish diseases. Create census data on communities involved in aquaculture. Determine the level of pollutants in economically important fish species. Develop markers and maps of important genetic traits. Knowledge of shellfish hatchery techniques that decrease time for growth to market size.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Medium Term - Identify spatial and temporal relationships between patterns of shellfish diseases in NJ and environmental correlates. To develop disease-resistant strains of shellfish. Develop superior disease-resistant and larger genetic lines of shellfish.Measure the impact of communities on the aquaculture industry. Knowledge of the feasibility of off-shore shellfish farming.

2. Associated Institution Types

- 1862 Extension
- 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)
Characterizing the Physical Environment of the Coastal Ocean and Its Relationship to Biological Indicators

Coastal ecosystems span from watersheds to the deep sea and are extremely complex. This complexity hinders planning for ocean resource management, sustainable development, energy policy, homeland security and emergency response. This lack of understanding is fueling governments around the world to build regional integrated coastal ocean observing networks. While only 10% of the oceans are coastal, they contain an abundance of natural resources and by 2050 it is estimated that 75% of Earth's human population will live within its watershed. In New Jersey, its beautiful coastlines are an integral part of the state's vibrant landscape, providing myriad recreational opportunities for residents and visitors from around the world. Beaches and other shorelines create jobs, support local business and invite new residents to make New Jersey

their home. New Jersey's coastlines and waterways attract an estimated $36 billion in tourism each year. In 2004 alone, tourism provided 38,431 jobs locally, $1 billion in payroll, $.6 billion to restaurants, $.5 billion in real estate sales and $.2 billion in recreational spending.

What has been done
NJAES researcher and Extension Specialist continued his research thrust by coordinating an extensive array of existing observational, data management, and modeling assets to generate and disseminate real-time data, now casts and forecasts of the ocean extending from Cape Cod to Cape Hatteras. An important component of the research was the outreach to stakeholders throughout the state with vested interests in the coastal ocean and to build an outreach program around the research to ensure that useful information is communicated to the appropriate stakeholders throughout New Jersey and beyond.

Results
The research focus was to identify important physical parameters sampled by the ocean observatory that predict the abundance and distribution of important fish species within the Mid-Atlantic Bight. Work within a multi-disciplinary team developed community and species-specific habitat models with application to fisheries management in the region. Work with partners from the commercial fishing industry to the development and evaluation of an environmentally based habitat model of butterfish with the specific purpose to inform an assessment in 2013. Butterfish is an important by-catch species in the longfin squid fishery. Through a series of workshops we gathered input from the industry, management and assessment communities and improved our existing model of butterfish habitat with their significant input. The success of the dissolved oxygen glider program has led to the development of a program in which Rutgers has partnered with NJDEP and EPA to push glider technology toward operational water quality monitoring. Work continues to identify relevant spatial and temporal scales observed by the glider missions that could change the way in which the coastal ocean is assessed and classified. We have also worked with fisheries scientists to identify the importance of different ocean observing data products in explaining variability in the physical ocean as it relates to coupled physical/biological processes and thus identify specific parameters useful as habitat indicators. The success of these initial models has led to the development of a team of stakeholders that include scientists, managers, and commercial fisherman to address the butterfish by-catch impact on the longfin squid fishery in the Mid-Atlantic Bight.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #3

1. Outcome Measures

Long Term - Clear and comprehensive understanding of community, environmental, genetic and physical regulators of aquaculture quality and quantity. A safe and secure aquaculture industry that can meet consumer demands for high-quality products and also be environment friendly and economically viable. Creation of superior aquaculture products that will be of high demand outside NJ.

2. Associated Institution Types

- 1862 Extension
- 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)
Marine Natural Product Discovery in Extreme Environments

With the lack of effective agents to control a spectrum of deadly cancers and viruses (e.g., HIV) and with drug-resistant microbes reaching epidemic proportions, pharmaceutical firms are actively searching for novel biodiversity to screen for bioactive natural products and are in the active process of attempting to synthesize many of the promising bioactive compounds.

What has been done
NJAES Researchers continue screening new extracts, fractions and compounds from the extensive collection of marine organisms, to create a library of apoptosis inducing compounds that have a potential to be developed as anti-cancer drugs, to continue sampling and basic research efforts at deep-sea hydrothermal vents and cold-water seeps at various sites in the oceans throughout the world, and undertake a diversity of educational initiatives, centered around the showing of a large-screen IMAX film entitled Volcanoes of the Deep Sea that we co-produced in conjunction with the Stephen Low Company and which is presently being shown at museums and science centers throughout the world. These efforts are an integral part of a concerted effort to educate an extremely large segment of the public to the wonders of the highly unique deep-sea ecosystems in which we are conducting our ongoing research efforts.

Results
During 2013, a paper was submitted in the high impact journal Marine Drugs, Mode of Action of Diterpene and Characterization of Related Metabolites from the Soft Coral, Xenia elongata. This work is a continuation of the US patent issued on our work composition and methods for treating cancer". Several diterpene analogues were synthesized and tested for apoptosis induction. Besides the work on various ecological and genetic studies of the deep-sea hydrothermal vent organisms, a tremendous amount of work has been done on the structural elucidation of natural compounds which include 1D and 2D NMR as well as interpretations and analyses of mass spectral data. Various outcomes and impacts of this project are featured on the following Rutgers/NJAES website: http://deepseacenter.rutgers.edu/. The issuance of the US patent for our work and our ongoing search for new natural generated interest on the part of major pharmaceutical companies in NJ regarding potential development and commercialization of the results for the treatment of wide variety of cancers such as breast and cervical cancers. Other challenging impacts are the development of new ceramide compounds and derivatives as new inhibitors of cancer cell growth. The mechanism of action of these interesting metabolites will

involve collaboration with several pharmaceutical science groups in NJ (e.g., Reaction Biology).

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #4

1. Outcome Measures

Medium Term - Collaborative Fisheries Research - Identify spatial and temporal relationships between patterns of shellfish diseases in NJ and environmental correlates. To develop disease-resistant strains of shellfish. Develop superior disease-resistant and larger genetic lines of shellfish.Measure the impact of communities on the aquaculture industry. Knowledge of the feasibility of off-shore shellfish farming.

2. Associated Institution Types

- 1862 Extension
- 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)
Collaborative Fisheries Research

Commercial and recreational fishermen in NJ struggle with the need to balance fishing activities and conservation. Natural resource managers at the state and federal level provide a management framework designed to keep these needs in balance, but they also struggle to understand the implications of climate change and changes to fish habitat for sustainable fishery management.

What has been done
Research on NJ fisheries involves fishermen and natural resource managers in a collaborative research process where they work alongside scientists to solve problems of mutual interest. Tagging study on black sea bass, involved tagging 1,500 individual black sea bass off the coast of NJ with the help of more than 60 volunteers. A larger but more diffuse group of fishermen assist the project by reporting recaptures of tagged black sea bass that they catch, but we have spread the word through posters at bait shops, boat ramps, and fish processing plants from

Rhode Island to Virginia. Electronic tagging study is to understand the passage of American shad and river herring through a fish ladder on the Raritan River. In a study funded by the NJ DEP, we have been working with volunteers including students from Rutgers and residents of Middlesex and Monmouth Counties to capture and tag fish as they migrate up the Raritan River on their annual spawning migration.

Results
Recreational and commercial fishermen in New Jersey and throughout the mid-Atlantic region and volunteer fishermen appear to be very satisfied with the program as our tagging trips are made up of approximately 80% repeat volunteers. Many of the fishermen reporting tagged fish also appear to be satisfied as approximately 20% of our tag returns are from fishermen who have already reported tags previously. Volunteer fishermen have reported increased knowledge of black sea bass reproductive biology which improves management of this important species. This work has also led to increases in knowledge about the biology including the important observations that sex change (from female to male) does not occur during the summer spawning session. This means that sex change cannot replace male fish that are caught during the spawning season, this increases the chance that size limits in the fishery can lead to skewed sex ratios in the population.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #5

1. Outcome Measures

Long Term - Shellfish Genetics and Breeding for Aquaculture - Clear and comprehensive understanding of community, environmental, genetic and physical regulators of aquaculture quality and quantity. A safe and secure aquaculture industry that can meet consumer demands for high-quality products and also be environment friendly and economically viable. Creation of superior aquaculture products that will be of high demand outside NJ.

2. Associated Institution Types

- 1862 Extension
- 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)

Shellfish Genetics and Breeding for Aquaculture

Shellfish are important marine resources. They support major aquaculture and fishery industries in the US and around the world. The sustainable development of the shellfish aquaculture is increasingly dependent on technological advances. Currently there are a number of problems and challenges facing the shellfish aquaculture industry, where genetic research and development can contribute greatly. The eastern oyster (Crassostrea virginica) industry along much of the Atlantic coast has been devastated by three diseases: Dermo (caused by Perkinsus marinus), MSX (Haplosporidium nelsoni) and ROD (caused by Roseovarius crassostreae).

What has been done

In 2013, NJAES Researchers conducted the following research under support from USDA/NRAC and USDA ARS: 1) continued selective breeding of disease-resistant eastern oysters and performed field evaluations; 2) provided the latest disease-resistant tetraploid eastern oysters to the industry for triploid production; 3) identified disease-resistance genes in the Pacific and eastern oysters; 4) participated in the international oyster genome project, which completed the sequencing of the Pacific oyster genome. In selective breeding, NJAES produced a new generation of Rutgers NEH disease-resistant lines. The new lines were deployed for field evaluation, 6 eastern oyster lines developed by various institutions including Rutgers University, Virginia Institute of Marine Science, University of Rhode Island and University of Maine were also evaluated.

Results

Results show that the Rutgers NEH line outperformed all other lines at Cape Shore in Delaware Bay, New Jersey. We provided Rutgers NEH disease-resistant stock to hatcheries for commercial production. We also provide tetraploid NEH stocks to the industry for the production of triploid oysters. For identifying disease-resistance genes, we sequenced the transcriptome of the eastern oyster and identified 657 genes related to immune response. Many key genes related to innate immunity are expanded in the eastern oyster revealing a complex defense system in the eastern oyster probably in adaptation to filter-feeding in a pathogen-rich environment. This gene set provides a valuable database for future studies on disease resistance in the eastern oyster. Rutgers importance to the industry was highlighted when the Haskin Shellfish Research Laboratory Shellfish geneticist was named a 2013 Inventor of the Year by the New Jersey Inventors Hall of Fame for helping decode the genome of the native eastern oyster to identify the genes responsible for disease resistance.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

NJAES research and extension outcomes related to this planned program were evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we included the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys were used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we focused on program delivery, participation, relevance and timeliness. Data was collected at appropriate times for each initiative that supports this planned program. IRB approved evaluation instruments were used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstration were collected and analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions. See state defined outcomes for detailed results of each initiative.

Key Items of Evaluation

None to report.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Food Safety

☑ 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
102	Soil, Plant, Water, Nutrient Relationships	5%		5%	
104	Protect Soil from Harmful Effects of Natural Elements	5%		5%	
311	Animal Diseases	0%		15%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	0%		15%	
404	Instrumentation and Control Systems	0%		10%	
501	New and Improved Food Processing Technologies	15%		15%	
502	New and Improved Food Products	10%		0%	
503	Quality Maintenance in Storing and Marketing Food Products	10%		0%	
504	Home and Commercial Food Service	20%		5%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	10%		10%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	10%		10%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%		10%	
723	Hazards to Human Health and Safety	15%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	4.0	0.0

Actual Paid Professional	5.8	0.0	4.4	0.0
Actual Volunteer	12.0	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**
137101	0	281124	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
492156	0	727374	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
137103	0	128140	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

• Conduct training and certificate programs for growers, producers, food workers, consumers and vendors to increase knowledge of food safety practicies.
• Design strategies, tools and processes to detect and eliminate pathogens, chemical and physical contaminants during production, transportation, processing and preparation of food.
• Invesitgate the ecology of threats to the food supply from microbial and chemical sources
• Develop technologies for the detection of food supply contaminants

2. Brief description of the target audience

• Producers
• Processors
• Retail - restaurants/vendors/supermarkets
• Department of Health
• Consumers, families, youth communites
• NJAES - faculty - staff - students
• Food manufacturers
• Schools - child care providers - food service workers

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	12326	16580	197	4487

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	1	23	24

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- -New methods in technologies -Educational workshops -Newsletters -Scientific publications -Patents -Website development -Extension publications -Volunteers trained -Agricultural and Industry Certifications -Train the trainer programs -Audits conducted

Year	Actual
2013	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Short Term - Increase knowledge of viable technologies, detection prevention, intervention and control technologies and practices to ensure food safety. Increase understanding of the ecology of threats to food safety from microbial and chemical sources.
2	Medium Term - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.
3	Long Term - A safe food supply resulting from reduced incidence of food-borne illnesses.
4	Medium Term - Economic Analysis on Market Responses to Food Scare Events - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.
5	Medium Term - Modeling and Risk Assessment of Food Safety Risks to the Food Supply - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.
6	Medium Term - Role of Foodborne Pathogen Cell Surface Moieties and Plant Defense Systems in Colonization of Crops Intended for Human Consumption. - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.
7	Medium Term - Studies of Pleurocidin, a Natural Antimicrobial Peptide, for Food Applications - Role of Foodborne Pathogen Cell Surface Moieties and Plant Defense Systems in Colonization of Crops Intended for Human Consumption. - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.
8	Medium Term - Development of Functional Biopolymers for Enhancing Food Safety and Quality - Role of Foodborne Pathogen Cell Surface Moieties and Plant Defense Systems in Colonization of Crops Intended for Human Consumption. - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.
9	Medium Term - Quality and Safety of Fresh-cut Vegetables and Fruits - Role of Foodborne Pathogen Cell Surface Moieties and Plant Defense Systems in Colonization of Crops Intended for Human Consumption. - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.
10	Long Term - Shifting Social Norms of Middle School Students with Regard to Food Safety - A safe food supply resulting from reduced incidence of food-borne illnesses.

Outcome #1

1. Outcome Measures

Short Term - Increase knowledge of viable technologies, detection prevention, intervention and control technologies and practices to ensure food safety. Increase understanding of the ecology of threats to food safety from microbial and chemical sources.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Medium Term - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.

2. Associated Institution Types

- 1862 Extension
- 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)
Food Preservation - Canning and Freezing

Interest in home food preservation - canning and freezing ?has increased as more people plant home gardens, participate in CSA's or buy from local farm markets. They want to preserve the extra produce for later in the year. Many people have never preserved food at home and others are using outdated or unsafe recipes and procedures.

What has been done
Family and Community Health Sciences Educators in Somerset and Hunterdon County used curricula from the USDA National Food Preservation Center and the Ball Company. The county workshops included demonstration or hands-on practice and video while the Rutgers University Home Gardeners School talk had a power point lecture and video and equipment discussion and display. The Family and Community Health Sciences Educator in Union County at the request from the Westfield Community Supported Agriculture (CSA) group offered a session on safe canning procedures.

Results

Participants in the county workshops reported gaining knowledge both in understanding the importance of proper food preservation to ensure safety and the techniques required for a safe and high quality product. Participants planned to preserve food. Canning post workshop evaluation: n=46 responded and reported planned changes in procedures and food preservation techniques. In procedures: 34 almost always only use tested recipes for canning, 39 almost always add lemon juice or citric acid before canning any tomato product, 13 almost always make jelly or jam using paraffin (wax) to seal the jar. In Food Preservation Techniques: 42 plan to can in a water bath canner, 20 plan to can in a pressure canner, 38 plan to can tomato products, 26 plan to can fruit, 19 plan to can vegetables, 21 plan to can pickles, 27 plan to can jam or jelly. Participants in the Westfield CSA session reported improved knowledge by 51% or more from the beginning to the end of class. Knowledge of using a pressure canner and water bath method increased by 82%, understanding acidity of foods increased by 90%, making jams, jellies by 6%, making pickles by 65% and freezing by 62%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
311	Animal Diseases
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
722	Zoonotic Diseases and Parasites Affecting Humans
723	Hazards to Human Health and Safety

Outcome #3

1. Outcome Measures

Long Term - A safe food supply resulting from reduced incidence of food-borne illnesses.

2. Associated Institution Types

- 1862 Extension
- 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)
Microbial Food Safety for the Fruit and Vegetable Industry

The fruit and vegetable industry is under increased pressure to improve their food safety practices and to obtain a third party audit confirming they are improving their practices. This is even more important with the enactment of the Food Safety Modernization Act which will be implemented over the next several years.

What has been done
NJAES researchers, RCE Agriculture Agents, staff and Extension Specialists delivered through the following methods: presentations at produce industry meetings across the state (30-60 minutes), monthly and weekly newsletter articles (Cultivating Cumberland and Statewide Plant and Pest Advisory ? Fruit and Vegetable Editions), website (http://njveg.rutgers.edu) where training materials are placed for self training and new food safety information is reported, facebook page (Rutgers Farm Food Safety), in-depth training sessions growers and buyers (4-6 hours), one-on-one critiques of food safety plans on individual farms (mock/second party audit), and webinar presentations.

Results
Growers have made major changes to their operation since this program was initiated. As an example, before the food safety program growers packed cilantro and parsley on packinghouse and garage floors. The product was harvested then dumped on the floors; hosed down then packed in boxes. There was no effort to sanitize floors or other packing surfaces. Growers now pack on tables that can be sanitized. Based on our research on possible pathogens in water some growers are installing sanitation systems on their irrigation water lines and sanitizing their packinghouse water. At least 75 operations have passed a third party audit in 2013.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
311	Animal Diseases

314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
722	Zoonotic Diseases and Parasites Affecting Humans
723	Hazards to Human Health and Safety

Outcome #4

1. Outcome Measures

Medium Term - Economic Analysis on Market Responses to Food Scare Events - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.

2. Associated Institution Types

- 1862 Extension
- 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)
Economic Analysis on Market Responses to Food Scare Events

The food supply chain that extends from farm to folk faces numerous food safety challenges, including naturally-occurring bacterial pathogen contaminations, intentional and unintentional animal disease outbreaks, and even possible terrorist attacks. Food scare events may have significant socio-economic consequences. According to the Center for Disease Control (CDC), food-borne illness sickens 76 million Americans, causes 325,000 hospitalizations and thousands of deaths, and costs $44 billion annually. In addition, market responses, including changes in food consumption, the market value of food companies, and futures prices of agricultural commodities, can generate even greater economic loss.

What has been done
NJAES Researcher supervised a G.H. Cook Scholar?s honor thesis titled "Consumer Perception and Responses to Different Food Scare Events." The following tasks have been completed: Upon IRB approval, we completed a survey among a focus group consisting 9 Rutgers undergraduates on February 22, 2013; (b) surveys were conducted among Rutgers Undergraduate students in different courses in March, 2013. A total of 200 Rutgers undergraduate students completed the survey; (c) empirical analyses were completed in early April 2013.

Results
The major findings are summarized as follows: (1) Food scare events create a stigma -- consumers are less willing to pay for food products that are involved in a food scare event even if the issue is resolved and the food product is safe for consumption; and (2) the stigma effect targets to the directly-affected food products -- consumers have a negative willingness to pay for products that were directly adversely affected by the food scare events but positive willingness-to-pay for the same products that were not affected.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
311	Animal Diseases
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
722	Zoonotic Diseases and Parasites Affecting Humans
723	Hazards to Human Health and Safety

Outcome #5

1. Outcome Measures

Medium Term - Modeling and Risk Assessment of Food Safety Risks to the Food Supply - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.

2. Associated Institution Types

- 1862 Extension
- 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)
Modeling and Risk Assessment of Food Safety Risks to the Food Supply

Use of predictive modeling and quantitative microbial risk assessment tools are gaining increased acceptance both by the food industry and by regulatory agencies. Despite this increased acceptance, the number of academic researchers actively involved in pioneering the use of these tools is very limited.

What has been done
NJAES Researcher and Extension Specialist and team of graduate and undergraduate students identify emerging issues that are amenable to study using predictive modeling and risk assessment techniques. Develop predictive models and/or quantitative microbial risk assessments based either on literature data or data collected in our laboratory. We utilize models and risk assessments to educate and inform the industry, as well as inform regulatory policy.

Results
Two predictive models and one quantitative microbial risk assessment were developed and published. Sharing of these and other models with policy makers and the food industry was accomplished at meetings, workshops and short courses throughout the reporting period. The first model for the inactivation of Bacillus coagulans spores in tomato pulp is significant for three reasons. First it represents an expansion of our work on spoilage organisms by investigating Bacillus coagulans for the first time. Second it expands and strengthens our capability to develop models for inactivation of microorganisms, where we have done only limited research. Finally and most importantly, the work strengthens our growing work with Brazilian food scientists. The risk assessment for quantification of aflatoxin risk associated with Chinese spices represents an important accomplishment in two respects. It represents the initiation of a collaboration with Chinese researchers, based in China, a first for our lab. Second, it reflects a broadening of our quantitative risk assessment work from foodborne pathogens to fungal toxins. As China seeks to modernize its food safety system, this work is an important step in the right direction. Given the global nature of the food supply, improving the safety of Chinese spices will have a positive effect worldwide, including US imports of Chinese spices.

4. Associated Knowledge Areas

KA Code	Knowledge Area

102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
311	Animal Diseases
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
722	Zoonotic Diseases and Parasites Affecting Humans
723	Hazards to Human Health and Safety

Outcome #6

1. Outcome Measures

Medium Term - Role of Foodborne Pathogen Cell Surface Moieties and Plant Defense Systems in Colonization of Crops Intended for Human Consumption. - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.

2. Associated Institution Types

- 1862 Extension
- 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)
Role of Foodborne Pathogen Cell Surface Moieties and Plant Defense Systems in Colonization of Crops Intended for Human Consumption

The lack of knowledge of foodborne pathogen-plant interaction hinders the development of effective strategies to reduce or eliminate foodborne pathogen contamination of leafy greens and

other fresh fruits and vegetables. Sanitizers and sanitizing practices presently employed commercially to reduce microbial numbers on fresh fruits and vegetables post-harvest are not adequate. There exist a real and immediate need to address foodborne-pathogen plant interaction to move forward in the development and initiation of strategies that will enhance the microbial safety of fresh fruits and vegetables.

What has been done
NJAES researchers worked to determine the range of bacterial cell surface moieties that induce the plant defense system. The entire Arabidopsis thaliana genome has been sequenced. Research is fundamental and mission-linked providing basic knowledge that advances basic and applied research that may be transferred to consumer and industry constituents alike.

Results
Experiments have demonstrated that environmental growth factors influence expression of bacteria cell surface moeties and that this, in turn, affects plant defense response. The expression of cell surface moieties including curli and capsule were increased when bacteria were cultured in the presence of manure or soil. Those bacteria were then applied to plants and specific plant defense response factors were monitored. Specifically, the PR2 gene was up-regulated, which influenced population of the target microbe on plant tissue. Growth or holding of bacteria in water had little influence on bacterial cell surface moieties.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
311	Animal Diseases
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
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504	Home and Commercial Food Service
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
722	Zoonotic Diseases and Parasites Affecting Humans
723	Hazards to Human Health and Safety

Outcome #7

1. Outcome Measures

Medium Term - Studies of Pleurocidin, a Natural Antimicrobial Peptide, for Food Applications - Role of Foodborne Pathogen Cell Surface Moieties and Plant Defense Systems in Colonization of Crops Intended for Human Consumption. - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.

2. Associated Institution Types

- 1862 Extension
- 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)
Studies of Pleurocidin, a Natural Antimicrobial Peptide, for Food Applications

Every year, food-borne diseases are estimated to affect between 68.7 and 275 million people in the U.S. alone, and cost about $15 billion in medical care and lost productivity. Food contamination, caused by pathogens in various raw or cooked fish and other foods and food products, affect millions of people annually.

What has been done
Every year, food-borne diseases are estimated to affect between 68.7 and 275 million people in the U.S. alone, and cost about $15 billion in medical care and lost productivity. Food contamination, caused by pathogens in various raw or cooked fish and other foods and food products, affect millions of people annually.

Results
NJAES researchers investigated: 1) the antimicrobial activity of pleurocidin against E. Coli and Listeria and 2), the effect of various proteins on the pleurocidin activity and the minimum inhibiting concentration of pleurocidin against E. Coli with a certain proteins. The results showed that pleurocidin could inhibit the growth of E. Coli and Listeria with MIC of 1.84μM and 34.68-69.36μM respectively. More importantly, all four chosen proteins (BSA, β-lactoglobumin, Albumin from egg white and Gelatin from bovine skin) showed different influence on the reduction of antimicrobial activity of pleurocidin. With proteins of 12mg/ml, pleurocidin represented different minimum inhibiting concentration against E. Coli. Based on these result, we have revealed that the efficacy of Pleurocidin may be reduced because pleurocidin interacted with

various proteins from food. This unexpected important finding is critical for the antimicrobial peptide (e.g. pleurocidin) application. Therefore, we need to investigate the mechanism of these types of interaction and possible ways of remediation immediately.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
311	Animal Diseases
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
722	Zoonotic Diseases and Parasites Affecting Humans
723	Hazards to Human Health and Safety

Outcome #8

1. Outcome Measures

Medium Term - Development of Functional Biopolymers for Enhancing Food Safety and Quality - Role of Foodborne Pathogen Cell Surface Moieties and Plant Defense Systems in Colonization of Crops Intended for Human Consumption. - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.

2. Associated Institution Types

- 1862 Extension
- 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)
Development of Functional Biopolymers for Enhancing Food Safety and Quality

Food-borne diseases are estimated to affect between 68.7 and 275 million people in the US alone and cost about $15 billion in medical care and lost productivity.

What has been done
NJAES Researchers work leveraging the research progress obtained from our laboratory to capture the new research opportunities in functional biopolymers and synthetic-biopolymers with controlled release properties useful for enhancing food safety and quality.

Results
Produced controlled release films containing mixed tocopherols using the blown film process, the cast film process, and the smart blending process. Analyzed the microstructure of these films using scanning electron microscopy, and quantified the release of mixed tocopherols from the films using the HPLC method developed. Developed a new concept called "target release rate" which is an important missing link necessary for applying this technology to the real world. Developed an innovative self-generating ClO2 packaging system using the biopolymer PLA and demonstrated its ability to greatly inhibit microbial growth in fresh tomatoes. Demonstrated that the combination of vapor phase AIT and modified atmosphere could effectively inhibit the growth of aerobic spoilage and pathogenic microorganisms in fresh catfish fillet, thereby extending the shelf life and increasing the microbial safety of this and other similar products. This study provides encouragement to encapsulate AIT into a suitable packaging biopolymer and use the biopolymer to develop modified atmosphere package to enhance the microbial safety of fresh seafood.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
311	Animal Diseases
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
722	Zoonotic Diseases and Parasites Affecting Humans
723	Hazards to Human Health and Safety

Outcome #9

1. Outcome Measures

Medium Term - Quality and Safety of Fresh-cut Vegetables and Fruits - Role of Foodborne Pathogen Cell Surface Moieties and Plant Defense Systems in Colonization of Crops Intended for Human Consumption. - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.

2. Associated Institution Types

- 1862 Extension
- 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)
Quality and Safety of Fresh-cut Vegetables and Fruits

As consumers opt for more food choices that feature both nutrition and convenience, pre-cut fruits and vegetables have become more prevalent in the produce section of food markets. Minimal processing of fruits and vegetables reduces shelf life and makes it easier for human pathogens to infest food.

What has been done
During 2012-2013, extensive research was conducted to discern whether these storage conditions are applicable for asparagus spears harvested under different strategies to extend the window of harvest.

Results
It was found that the respiration rates of spears harvested from all mother stalk treatments were, on average, 50% of conventional harvest, as determined from rate studies of headspace gas compositional changes. Therefore, a ratio of .04 micropores per gram is more conducive to maximum pre-cut shelf life and spear quality. The respiration rates of pre-cut spears from extended conventional and mid-season clear cut were not significantly different than the conventional harvest controls. These results will be crucial for practitioners that produce and market pre-cut asparagus spears for an extended period using both conventional and mother stalk harvesting methods.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
311	Animal Diseases
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
722	Zoonotic Diseases and Parasites Affecting Humans
723	Hazards to Human Health and Safety

Outcome #10

1. Outcome Measures

Long Term - Shifting Social Norms of Middle School Students with Regard to Food Safety - A safe food supply resulting from reduced incidence of food-borne illnesses.

2. Associated Institution Types

- 1862 Extension
- 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)
Shifting Social Norms of Middle School Students with Regard to Food Safety

Little attention has been given to children and teens? understanding of safe food handling knowledge and skills, despite their interests in studying food safety and preparing food, growing

food shopping and preparation responsibilities, and future roles as caregivers for infants, young children, and elderly parents.

What has been done
The Don?t Be Gross, a video based social marketing campaign, was developed in collaboration with New Mexico State University and implemented in 5 states (NJ, NY, TX, MN, OH) and evaluated in 17 schools, to promote improved food safety behaviors of middle school youth and to determine the feasibility of disseminating the videos through peer networks and their effects on food safety attitudes, perceived social norms and behaviors of youth.

Results
The experimental group completed the following activities at about one week intervals: pretest, viewed video snacks, posttest and follow-up test. The control group completed the same activities at similar intervals but did not have access to the video snacks until after the follow-up test. Linear mixed-effects models, controlling for grade and gender revealed significant time by group effects for participants? perceived susceptibility to foodborne illness; intentions to perform recommended food safety behaviors approached significance. Additionally, compared to the pretest, the experimental group perceived their friends as being significantly more confident in performing food safety behaviors at post- and follow-up tests. Google analytic data revealed that the bounce rate for the main home page of the videos was low suggesting that the video snacks were engaging. The Don?t Be Gross videos were well received by youth and shared amongst their peers and may have the potential to promote positive food safety behaviors and intentions among youth.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
311	Animal Diseases
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
404	Instrumentation and Control Systems
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
722	Zoonotic Diseases and Parasites Affecting Humans
723	Hazards to Human Health and Safety

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

None to report.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

NJAES research and extension outcomes related to this planned program were evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we included the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys were used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we focused on program delivery, participation, relevance and timeliness. Data was collected at appropriate times for each initiative that supports this planned program. IRB approved evaluation instruments were used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstration were collected and analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions. See state defined outcomes for detailed results of each initiative.

Key Items of Evaluation

None to report.

V(A). Planned Program (Summary)

Program # 9

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
605	Natural Resource and Environmental Economics	100%		100%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	2.0	0.0
Actual Paid Professional	4.3	0.0	1.5	0.0
Actual Volunteer	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
36016	0	69659	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
528212	0	325543	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1077	0	6673	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Perform experiments to investigate renewable energy production.

- Develop methodologies and scientifically sound alternatives to fossil fuels
- Educate homeowners, business owners, farmers and agri-related businesses, youth and families about conservation and efficiency practices related to energy use.
- Provide education and training to enhance bio energy related job development and careers.

2. Brief description of the target audience

- University faculty, staff and students
- School aged youth
- Families
- Homeowners
- Farmers
- Agri-businesses
- State agencies and organizations
- Industry partners
- Small businesses
- Entrepernuers
- Policy and decision makers

3. How was eXtension used?

Farn Energy CoP was used as a resource for faculty staff and clientele.

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1826	1172	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	7	7

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- -Scientific publications and patents produced -Participants reach through direct and indeirect education -New methodologies and technologies developed

Year	Actual
2013	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Short Term - Increase knowledge, energy efficiency technologies and conservation practices related to energy use. Explore research strategies to replace fossil fuel consumption.
2	Medium Term - Participants in direct and indirect educational methods will adopt practices to conserve energy use and reliance on fossil fuels. Business owners will create and maintain green jobs/careers as a result of bioenergy development. Newly developed plants and technologies will be adopted to enhance energy independence.
3	Long Term - Fossil fuel consumption will be replaced with biofuels. Economic development will be enhanced through an increase of jobs and careers as a result of bioenergy development. Environment quality enhanced as a result of sustainable biofuel production and utilization.
4	Medium Term - Microbial Processes in Bioenvironmental Engineering: Bioremediation, Bioaerosols and Bioenergy -Participants in direct and indirect educational methods will adopt practices to conserve energy use and reliance on fossil fuels. Business owners will create and maintain green jobs/careers as a result of bioenergy development. Newly developed plants and technologies will be adopted to enhance energy independence.
5	Medium Term - The Science and Engineering for a Biobased Industry and Economy - Participants in direct and indirect educational methods will adopt practices to conserve energy use and reliance on fossil fuels. Business owners will create and maintain green jobs/careers as a result of bioenergy development. Newly developed plants and technologies will be adopted to enhance energy independence.

Outcome #1

1. Outcome Measures

Short Term - Increase knowledge, energy efficiency technologies and conservation practices related to energy use. Explore research strategies to replace fossil fuel consumption.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Medium Term - Participants in direct and indirect educational methods will adopt practices to conserve energy use and reliance on fossil fuels. Business owners will create and maintain green jobs/careers as a result of bioenergy development. Newly developed plants and technologies will be adopted to enhance energy independence.

2. Associated Institution Types

- 1862 Extension
- 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)
Reducing Greenhouse Energy Use by Investigating Current and Alternative Technologies

Controlled environment plant production systems (greenhouses and growth chambers) are used worldwide to produce high quality plant material (produce, floriculture, and nursery crops). Rising energy prices have made a significant impact on the profitability of many greenhouse operations. Engineering information and solutions can help growers reduce energy use and operating costs.

What has been done
Research was conducted on an alternative energy project originally funded by the New Jersey Department of Environmental Protection (landfill gas fired microturbines used for heat and power production at the NJ EcoComplex greenhouse in Bordentown, NJ). A graduate student completed his Ph.D. Two are ongoing projects that are collaborations with several other educational institutions from across the country. One investigates the use of light emitting diode (LED) lighting systems for photoperiodic and supplemental lighting of vegetable and flowering crops. The other

aims to develop an online (undergraduate) course consisting of individual lectures (modules) focused on engineering and crop production issues that can be integrated into a variety of courses related to controlled environment plant production.

Results
Greenhouse energy use research has resulted in new information that has been communicated with the industry through Extension bulletins, fact sheets, presentations and trade magazine articles. Growers who implemented the information resulting from the research and the various presentations and publications have been able to realize energy savings between 5 and 30%. Updating and disseminating energy conservation information is helping to further reduce dependence on scarce fossil fuel resources. Incorporation of heat pump technology to take advantage of heat storage to provide both heating and cooling can reduce total energy requirements.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

Long Term - Fossil fuel consumption will be replaced with biofuels. Economic development will be enhanced through an increase of jobs and careers as a result of bioenergy development. Environment quality enhanced as a result of sustainable biofuel production and utilization.

2. Associated Institution Types

- 1862 Extension
- 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)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

Medium Term - Microbial Processes in Bioenvironmental Engineering: Bioremediation, Bioaerosols and Bioenergy -Participants in direct and indirect educational methods will adopt practices to conserve energy use and reliance on fossil fuels. Business owners will create and maintain green jobs/careers as a result of bioenergy development. Newly developed plants and technologies will be adopted to enhance energy independence.

2. Associated Institution Types

- 1862 Extension
- 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)
Microbial Processes in Bioenvironmental Engineering: Bioremediation, Bioaerosols and Bioenergy

Understanding and/or controlling microbial communities across a range of environments can allow better prediction of environmental outcomes, restore polluted environments and achieve a more sustainable environment.

What has been done
NJAES researcher continued work investigating microorganisms in natural and engineered systems whose activities have an impact on ecological and human health and environmental sustainability. The research activities associated with this project are focused in three major thrust areas in the field of bioenvironmental engineering: (1) Bioremediation, (2) Bioaerosols, and (3) Bioenergy.

Results
Outcomes and results of this research will benefit residents of New Jersey, the USA and the world by providing new information about the function and identity of microorganisms involved in atmospheric processes, environmental restoration and sustainable energy production. Specifically, during this reporting period we published in the journal Biomass and Bioenergy a theoretical model showing that the ammonia that is released by microbes during anaerobic digestion of wastes can be harvested and converted to hydrogen
(a biofuel) in a manner that improves the energy balance of the digestion process, which normally produces only methane as a fuel. This work established scientific and engineering parameters for the production of the biofuels methane and hydrogen from diverse waste biomass at different carbon to nitrogen ratios. This finding has broad implications for changing the way wastes ? human waste, municipal solid waste, food waste, or animal wastes?might be handled for energy production in the future. This work made a substantial contribution to the quest for alternative energy.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

Outcome #5

1. Outcome Measures

Medium Term - The Science and Engineering for a Biobased Industry and Economy - Participants in direct and indirect educational methods will adopt practices to conserve energy use and reliance on fossil fuels. Business owners will create and maintain green jobs/careers as a result of bioenergy development. Newly developed plants and technologies will be adopted to enhance energy independence.

2. Associated Institution Types

- 1862 Extension
- 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)
The Science and Engineering for a Biobased Industry and Economy

The U.S. must drastically reduce its dependence on petroleum. This is not the fetish of a small proportion of the population; the U.S. society as a whole recognizes the need to reduce its dependence on petroleum as a source of fuels, chemicals and other materials. Meeting food production needs are staggering. It requires 100 fold more energy to sustain the current U.S. standard of living, than it does to nourish our bodies. For example, the U.S. consumes 100 quadrillion Btu annually for food production. Of the 100 quadrillion Btu/year used, energy necessary to sustain our population is 1.2 quadrillion Btu. The other portion of the 100 quadrillion Btu is accounted by agricultural and industrial production, liquid transportation fuels, heating and lighting needs. This means that supporting a global population of 10 billion at the current standard of living of the U.S. requires 4,000 quadrillion Btu annually worldwide. These demands cannot be sustained with the current technology base, and alternative and sustainable technologies must be developed and refined. At the same time, increasing reliance on bio-based energy technologies creates competing demands for land currently used for food production, with consequences for food prices.

What has been done

The research assessed the economic and environmental implications from the introduction of biobased products such as agricultural waste, food waste and algae. It focused on the impacts of the introduction of corn-based ethanol on the petroleum industry, including home heating fuels, residual fuels and bitumen (in addition to gasoline and diesel products). Because many of these petroleum products have significantly higher carbon content per gigajoule than gasoline and diesel, this can substantially impact the lifecycle analysis of biofuels.

Results

The introduction of biofuels can, in principle, reduce the GHG emissions of transportation fuels by 46-70%. The socioeconomic impact of biomass depends to a large extent on understanding and managing the process of adoption of viable technologies. In NJAES research, a conceptual and empirical framework was developed, that explains adoption of agricultural AD technologies while incorporating interdependencies at various production and consumption levels. When evaluating the environmental implications. The lifecycle analysis was expanded to include emissions that occur away from the site of final production or consumption. The insight developed was disseminated to the community via conferences, publications in peer-reviewed journals, conference proceedings, and book chapters. An outreach component was also developed to educate local administration in NJ of the benefits of using waste to energy methods.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Other (Consumption Practices)

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

N NJAES research and extension outcomes related to this planned program were evaluated utilizing a variety of evaluation methods appropriate for each initiative to determine effectiveness on both a qualitative and quantitative level. For KASA and practice change we included the measurement of knowledge gained as measured by pre/post Likert-scale assessments. Surveys were used to measure increase in skills acquired, behavior change and practice adoption. For process evaluation we focused on program delivery, participation, relevance and timeliness. Data was collected at appropriate times for each initiative that supports this planned program. IRB approved evaluation instruments were used to collect research and extension data. Data analyses and comparisons relevant to basic and applied research and demonstration were collected and analyzed and reported utilizing a variety of data collection methods appropriate to each research question.

The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions. See state defined outcomes for detailed results of each initiative.

Key Items of Evaluation

None to report.