

# 2012 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 non federal 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
- Sustainability of the NJ Equine Industry and its Impact on Agriculture and Open Space
- 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 for RCE educational programs to underserved,

underrepresented audiences and reduce any real or perceived barriers to participation.

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 wellOeducated highly skilled workforce

Developing sustainable growth strategies for urban and rural communities

The capacity and resiliency of the state was tested by a range of natural disasters including, floods, drought, hurricanes, early season frosts and superstorm Sandy. The resources and expertise of faculty and staff were responsive and relevant as they addressed the immediate and critical needs of our residents. Sandy was reported to be New Jersey's most destructive coastal storm of the past century, bringing record levels of precipitation and wind gusts reaching as high as 88 miles per hour.

The Rutgers NJAES water resources programs have addressed innovative methods of optimizing nursery production systems so that growers can maximize output whole minimizing environmental impact. Nurseries require high quality quantitative of water for production resulting in impacts through the movement of sediment into rivers and ponds. With the supports of external funds, a river watershed restoration and protection plan was developed. As a result of this initiative, water is recycled, reducing the need for ground water removal by about 40%. Another nursery is completing a project to recapture 100% of the excess irrigation water and recycled it, thereby reducing ground water withdrawal needs by about 50%

On the urban front stormwater management and water conservation has become critical parts of the curriculum at the East Orange VA Hospital, which generates large volumes of stormwater runoff. Rain barrels and rain gardens were installed to collect roof runoff, prevent flooding and irrigate community gardens.

NJAES researchers, Extension Specialists, faculty and staff are engaged in research and outreach to address critical issues related to nutrition diet and health and the continued battle against childhood obesity.

Through the Get Moving Get Healthy educated program youth and adults have engaged in a systems approach to obesity prevention.

Participants have increases physical activity and are making healthy food choices. The Grow Healthy School Wellness Programs are encouraging increased consumption of fruits and vegetables students are willing to taste unfamiliar foods. As a result of the programming, Hunterdon County achieved the Bronze level status of USDA's Healthy US School Challenge.

The Seeds to Success Youth Farmstand program has reached a new level of maturity, where at-risk special needs youth lives have been impacted by the program. They have increased their consumption of fruits and vegetables, created a retail outlet for economic development in their community, improved food security and nutritional well-being, workforce development and improved quality of life.

Out-of-School Time Science Trainers delivered Design It/Explore It workshops which provide an opportunity for youth to explore and learn about science and technology in a positive non-threatening, hands-on and fun environment. Participants report that they feel more capable of problem-solving and making changes to improve performance, increased interest in engineering and improved skills in working a part of a team all of which will aid in a more literate science based workforce for America.

are adapted to local growing conditions and markets. Weather related factors such as severe cold outbreaks in winter and late frosts in the spring, can seriously limit yields for growers. NJAES researchers and Extension Agents continue to develop cultivars with improved disease resistance and adaptation to their growing environments, as a result, patents have been issued and new cultivars have been released commercially to the public. This has resulted in reduced requirement for pesticides, environmental impact and a safer food and water supply.

Stormwater management techniques for Runoff Reduction with demonstrations of permeable pavement and rain gardens were presented to municipal engineers and officials in highly urbanized communities. Permeable pavement is a surface that allows water to pass through into an underlying storage layer. The stormwater best management practice provides both water quality and control improvement. Municipalities have implemented systems after incidences of severe flooding, resulting in the capture and treatment of more than 114,000 gallons per year in Passaic County and the interception and infiltration of up to 16,156 gallons per event in a newly installed permeable pavement sidewalk at the East Orange VA Hospital.

Endemic pests and invasive insects threaten the livelihood of NJ's long-standing fruit production. This is particularly true for peach, wine grapes and cranberries. A phenological model and a reduced spray program for management of Brown Marmorated Stink Bug (BMSB). The immediate result of the NJAES research program have been a decrease in the amount of insecticide active ingredient applied to tree fruit. This increases economic outputs for the grower, increases worker safety and reduces the amount of materials put into the environment.

Funding from government sources provided NJAES with a foundation for program development and delivery, while competitive grants, contracts and gifts increase the scope and impact of applied research and education programs.

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.

The state appropriation for 2012 totaled \$21.742 million, remaining unchanged from FY11. "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.

NJAES expended a total of \$91.7 million to support research and extension activities in 2012; this represents a 5% increase in spending over FY11. State appropriations supported 23.8% of FY12 expenses, compared to 25.0% in 2011, continuing the trend of a declining role of state support for NJAES activity. 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. About 38% of grant-funded expenditures in FY12 came from awards to the Supplemental Nutrition Assistance Program-Education (SNAP-Ed/Extension), the IR-4 program, and the Office of Continuing Professional Education. Grant income in FY12 also supported horticultural, plant breeding, and plant pathology research; international cooperative efforts in agricultural innovation and research on climate change, water quality, and other environmental issues; innovations in food processing; and advances in food safety. Together, these activities accounted for another 29% of all grant-funded expenses.

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

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	156.0	0.0	65.0	0.0
Actual	159.6	0.0	53.7	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 2012 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
- 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 2012 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.**

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.

**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.**

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.

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

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.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
2632466	0	3332305	0

2. Totaled Actual dollars from Planned Programs Inputs				
Extension			Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	3440079	0	3141793	0
Actual Matching	11732931	0	14379297	0
Actual All Other	2215952	0	9678874	0
Total Actual Expended	17388962	0	27199964	0

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

**V. Planned Program Table of Content**

S. No.	PROGRAM NAME
1	Climate Change - Water Quality & Quantity
2	Childhood Obesity - Youth/Adult Obesity
3	4-H Youth Development
4	Global Food Security and Hunger - Agricultural Viability
5	Sustainability of NJ Equine Industry and Its Impact on Agriculture and Open Space
6	Climate Change - Home, Garden and Environment
7	Global Food Security and Hunger - Integrated Pest Management
8	Global Food Security and Hunger - Aquaculture
9	Food Safety
10	Sustainable Energy



**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	20%		20%	
111	Conservation and Efficient Use of Water	20%		20%	
112	Watershed Protection and Management	20%		20%	
133	Pollution Prevention and Mitigation	20%		20%	
605	Natural Resource and Environmental Economics	20%		20%	
	<b>Total</b>	100%		100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	8.0	0.0	4.0	0.0
Actual Paid Professional	9.8	0.0	4.6	0.0
Actual Volunteer	149.0	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
216831	0	229923	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
763700	0	1123823	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
186731	0	688060	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?**

eXtension was not used in this program

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

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	2321	1770	0	0

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

**Patent Applications Submitted**

Year: 2012

Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
Actual	8	36	44

**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
2012	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	Community-based Green Infrastructure Initiative for Urban New Jersey: 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.
5	Decentralized Stormwater Management Throughout New Jersey: 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.

**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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Water Quality

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 it 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. Impacts generated from agricultural production are largely through the movement of sediment into rivers and ponds. Along with these sediments are nutrients, with phosphorus being the primary offender because it attaches to soil particles that are moved to the surface bodies of water.

**What has been done**

Two funded research projects (\$333,681 in 2001 and \$306,873 in 2005) documented that homeowners, businesses, municipalities and agricultural producers have all impacted the quality of surface waters in Cumberland County. As a result, of the Upper Cohansey Watershed research project, a river watershed restoration and protection plan was developed. Within the plan, was a section on agricultural management practices that was drafted for container and field nurseries. Funds for establishment of vegetative buffers and bio-retention structures in the Upper Cohansey watershed released in 2012 total \$712,500.

A nursery survey is in its final stages of completion. The Upper Cohansey Mini-grant Guide has also been completed. A Topics in Nursery Production educational meeting will be held on February 20, 2013 focusing on water quality issues.

**Results**

Initiation of the project was in response to grower requests to identify if the nursery industry had a part in degradation of surface waters in Cumberland County. 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**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

<b>Year</b>	<b>Actual</b>
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2012

0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

##### Sustainable Landscaping and Stormwater Management Training for Unemployed Veterans

Many veterans are in need of educational or training opportunities for employment in the private sector. The unemployment rate for the general population has been holding steady around 9%, while that of the veteran population is 13% (US Bureau of Labor Statistics, 2011). Complicating their situation is their need for therapies to help manage a range of health issues related to their service. The therapeutic value of horticulture and employment opportunities in the landscaping industry led to a collaboration with the Department of Veterans Affairs to implement this program. The training program provides technical and experiential learning in horticulture, vegetable production, storm water management, water conservation and landscape maintenance, while providing an opportunity for veterans to become re-acclimated to the formal educational structure of a classroom. The goals of this effort are to enhance skills needed in the green jobs sector and to improve the likelihood of employment.

#### What has been done

In October 2008 an introductory gardening workshop was offered to 16 veterans and staff at the VA hospital in East Orange, NJ. This program led to the creation of an on-site community garden. Over the course of the past three growing seasons this garden produced in excess of 6,000 lbs of tomatoes, peppers, eggplant, collards, cabbage, kale and herbs. Vegetables were used by the VA culinary program, shared with landscape workers (veterans) as well as homeless veterans. One of the veterans used his new knowledge of horticulture to begin a successful lawncare company; his experience led the idea of developing a formal landscape training program.

In 2011 stormwater management and water conservation were added to the curriculum. The East Orange VA Hospital generates large volumes of stormwater runoff and the administrators asked for assistance with management of runoff. The veterans' training included the design and installation of a rain garden on the hospital grounds. This rain garden managed stormwater runoff from a nearby parking lot, immediately improving public access to the hospital, particularly for disabled veterans, by eliminating muddy sediments from blocking the sidewalk entrance. Rain barrels were also installed to collect roof runoff, prevent flooding, and to irrigate the community gardens.

In 2011, VA staff recruited 9 individuals for the second landscape training class. The landscape maintenance training was based on the core curriculum of the Rutgers Master Gardener training program and included fifteen 3 hour lectures, and 300+ hours of a supervised landscaping internship on the grounds of the VA/East Orange. Seven of the nine students successfully completed the training program. The VA employment counselors are working with the graduates to introduce them to employers in the landscape industry.

#### Results

Prior to the training program none of the veterans had considered a career in landscaping or lawncare as an option. Evaluations after program completion showed that 90% of participants felt more confident about looking for work in the landscaping field and 100% were glad that they participated in the program. Participants reported that their knowledge increased from a 2.2 to 7.8 (1 = Low, 10 = High) for landscape management and increased from a 1.3 to 8.5 (1 = Low, 10 = High) for stormwater management. The program has been judged a success by the partnering VA

staff and another class will be starting in March of 2013.

Two participants started their own landscaping businesses and one started a new community garden in Newark so he can share his new-found knowledge about gardening with local residents. The rain barrels built and installed by program participants at the East Orange VA Hospital site are preventing 9,100 gallons of stormwater per year from entering the sewer system, while providing water for the irrigation of the garden beds and greenhouse. The facility has saved \$200 (\$10 disposal fee/barrel) by avoiding disposal fees of the recycled plastic drums used to build the rain barrels and has reduced water usage by more than 9,000 gallons per year, resulting in additional savings.

The cistern installed at the family center in Newark can collect more than 14,000 gallons of rainwater per year to be used in the center's community garden for plant irrigation. The center had no way to water the garden, as there is no running water at the site. The 14,000 gallons of stormwater prevention is especially important in the City of Newark, which has a partially combined sewer system that overflows often during wet-weather events.

The rain gardens built, installed, and maintained by the trainees are capturing, treating, and infiltrating 44,708 gallons of runoff per year at the East Orange VA site, resulting in the removal of 8.2 pounds/year of total suspended solids (TSS) (90% removal of 19 mg/L TSS from roof runoff), 0.041 pounds/year of total phosphorous (TP) (80% removal of 0.11 mg/L TP from roof runoff), and 0.33 pounds/year of total nitrogen (TN) (50% removal of 1.5 mg/L TN from roof runoff). [Removal rates from EPA Stormwater Menu of BMPs (Accessed August 2012) and typical stormwater concentrations are from the New York State Stormwater Design Manual (2010)]. The raised garden beds planted and maintained by program participants have produced 4,155 pounds of fresh produce (2011 and 2012) that have been donated directly to unemployed and homeless veterans with limited access to fresh vegetables.

#### 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

Community-based Green Infrastructure Initiative for Urban New Jersey: 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
2012	0

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

**Issue (Who cares and Why)**

Community-based Green Infrastructure Initiative for Urban New Jersey

Water and sewer infrastructure systems in many communities throughout New Jersey are reaching the end of their functional life and will need repair and replacement over the next decade. Opportunities exist to reduce costs for replacing this aging infrastructure using new techniques and technologies, better preparing the state for a sustainable future. Infrastructure planning and design approaches are needed that reduce demand on existing infrastructure, extend its functional life where possible, and provide cost-effective and sustainable solutions that conserve and protect water resources while improving the quality of life.

**What has been done**

Rutgers Cooperative Extension (RCE) Water Resources Program has partnered with local nonprofit organizations in urban municipalities to pilot community-based initiatives addressing environmental health issues through education programs and implementation of green infrastructure projects. The program and projects focus on priority environmental issues identified by the communities, including efforts to manage vacant properties, reduce nonpoint source water pollution, reduce combined sewer overflows and flooding, addressing the impact of brownfields on community health, and upgrade aging infrastructure. As part of the educational programs, demonstration green infrastructure projects are being constructed to capture, treat and infiltrate (where possible) stormwater runoff.

**Results**

Four (4) rain gardens were installed, capturing approximately 100,000 gallons of stormwater annually; 50 rain barrels were built and installed, capturing approximately 175,000 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

**Outcome #5**

**1. Outcome Measures**

Decentralized Stormwater Management Throughout New Jersey: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Decentralized Stormwater Management Throughout New Jersey

Improved stormwater management is important in New Jersey since several lakes and streams have been designated as impacted by state regulators, and stormwater can be a major contributor of pollutants to waterbodies. It is of further importance, since improved stormwater management techniques such as rain barrels and rain gardens decrease the use of potable water for irrigation, and, in the case of rain gardens, recharge groundwater aquifers. Water conservation is critical where potable water sources are taxed by multiple users including residents, businesses, landscape irrigation, and agriculture. In a larger sense, improving stormwater management is an essential tool for municipalities to help combat the potentially negative effects of climate change, such as increased flooding and more-severe droughts.

**What has been done**

Two Rain-barrel workshops were held in which participants were educated about the importance of decentralized stormwater management, built their own rain barrels, and then installed them at their residences or businesses. In addition, rain garden workshops were held in which participants learned about the importance of rain gardens as a tool for stormwater management. Volunteers planted and completed demonstration rain gardens.

The Stormwater Management in Your Schoolyard program educates youth about watersheds,

nonpoint source pollution, and how students can solve water issues in their communities through the use of best management practices, such as rain gardens and rain barrels. Also, a hands-on rain garden planting on the school grounds is incorporated into the educational program. The Stormwater Management in Your Schoolyard educational program was conducted at eleven (11) school systems in New Jersey.

**Results**

Programming resulted in environmental benefits of water conservation and water pollution prevention, as well as knowledge gain and the expectation of behavior change among program participants. Based on average installation rate of past workshop attendees, this equates to approximately 1,540,000 gallons per year of both improved stormwater management and potable water conserved. A completed rain garden is expected to manage 13,000 gallons per year of stormwater. In 2012 150,000 gallons of stormwater were captured, resulting in decreased pollutant loads to local waterbodies by retaining common pollutants such as sediment, phosphorus, and nitrogen. Evaluation of participants in the rain garden classes showed an increase in knowledge about using rain barrels for decentralized stormwater management, methods for conserving water at home, and specifics about using and maintaining rain barrels.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

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

**Evaluation Results**

See Qualitative State Defined Outcomes for Evaluation Results

**Key Items of Evaluation**

See Qualitative State Defined Outcomes.

**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%	
	<b>Total</b>	100%		100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	6.0	0.0	5.0	0.0
Actual Paid Professional	24.9	0.0	7.7	0.0
Actual Volunteer	218.0	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
664033	0	345457	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1425801	0	1772672	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
457738	0	2593127	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?**

Faculty and staff utilized the Families, Food and Fitness  
 Financial Security for All  
 Diabetes  
 Faculty answered frequently asked questions and developed collaborative educational products.

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

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	32799	12182	0	1346

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

**Patent Applications Submitted**

Year: 2012  
 Actual: 2

**Patents listed**

61-636,254  
 PCT/US2011/064633

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

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
<b>Actual</b>	0	57	57

**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
2012	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	Get Moving ? Get Healthy: 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.
5	Promotion of Nutrition, Healthy Lifestyles and Adolescent/Youth Life Skills: 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.
6	Family Economics: Steps to Health and Wealth: 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-



	<p>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.</p>
7	<p>Postharvest Biology of Fruits: 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.</p>
8	<p>Introducing New Crops, Nutraceuticals and other Value-Added Products: 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.</p>
9	<p>Assessing and Addressing Individual and Environmental Factors That Influence Eating Behavior of Young Adults: 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.</p>
10	<p>Evaluation and Characterization of Novel Botanical Extracts for the Prevention and Treatment of Metabolics Syndrome and Diabetes: 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.</p>
11	<p>Taste Genetics, Food Choice and Obesity: 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-</p>

	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.
12	Sustainable Me: 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.
13	Seeds to Success Youth Farmstand: 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.

**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
2012	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Healthier Family Meals

Research indicates those families who eat healthy meals together have a stronger family unit and are healthier socially, emotionally and physically.

#### What has been done

Family and Community Health Sciences Educators have conducted educational programs spanning the state and reaching residents across the life span to promote better health and well-being. The Building Healthy Kids Coalition (BHKC) continues to engage representatives from a variety of agencies and organizations to address the issues related to childhood obesity.

The 2012 Children's Health Summit (CHS), a collaborative initiative with the NJ Department of Health and Senior Services and the Partnership for Healthy Kids/YMCA emphasized a systems approach to obesity prevention.

Educational programs were conducted so that individuals and families adopt recommended food safety practices in the home including hand washing, cross contamination, time and temperature controls and food preservation procedures.

#### Results

Participants reported that they would serve more healthy meals to their families, make water and low-fat milk the beverage choice, eat a diet rich in fruits and vegetables. Ninety-nine percent support healthy school lunches for kids, 98% will make family mealtimes a priority, 92% are ready to change their behavior to eat more whole grains, fruit, veggies and non-fat dairy products, and 90% will follow the nutrition recommendations of MyPlate.

A participant in a food preservation canning and freezing workshop noted, "Great class from start to finish. Good resource list and nice show of products to help my "hands on brain" to really help myself to pursue this healthier and more self-sustaining lifestyle!"

## 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Grow Healthy School Wellness Programs/Promotion of Nutrition, Childhood Obesity Prevention, and Healthy Lifestyles

The prevalence of chronic disease is largely attributed to preventable lifestyle behaviors that include, poor nutritional balance with physical activity, obesity in children and adults, and fewer opportunities during the day, especially among school aged children to learn about food.

**What has been done**

To promote better health and wellbeing, Rutgers Cooperative Extension Family and Community Health Sciences (FCHS) educators taught elementary school children in nine New Jersey schools how to grow vegetables and fruits through the Grow Healthy Team Nutrition educational program. The schools created wellness councils to engage families in volunteerism. Taste tests introduced students to new foods and highlighted Farm to School initiatives such as school gardens and purchasing locally-grown produce. A key component of the Grow Healthy Team Nutrition

program encouraged walking, activity throughout the day.

### Results

As a result, In Gloucester County the Grow Healthy programming yielded a number of conditional changes: created two new and one expanded edible school gardens, expanded use of the school garden, by involving more teachers and school nutrition professionals, increased access to healthier foods via new offerings on the cafeteria's lunch menu, created sustainable nutrition education initiative by training FCHS Wellness Champions to support school wellness and nutrition education, created stronger, more active wellness councils in 2 schools, and one school created a special program (Grow Healthy Wellness Champions) that recognizes students who select and eat more fruits and vegetables, resulting in a list of 50+ children with documented increased fruit/vegetable consumption as a result of the project. In Hunterdon County, commitment demonstrated to a healthier school food environment school-wide resulted in achievement of the Bronze level status of USDA's Healthy US School Challenge.

Results of the Podometer Program showed that: average weekly steps between week 1 and week 5 in experimental schools remained steady while steps in control schools showed a statistically significant decrease ( $p < 0.001$ ), and male students in experimental schools had a higher number of steps than female students in every week, including the average of the last 4 weeks.

Data indicated that students were willing to participate in taste testing's in the classroom setting, and that the majority were willing to eat the foods again. Of the students who completed the tasting cards, 83% were either 'willing' or 'very willing' to taste the food and 62% were willing to eat the food again.

## 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

Get Moving ? Get Healthy: 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
2012	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Get Moving ? Get Healthy

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

The 4-H Youth Development program used the GMGH program to train teens who reached 2,000 underserved youth in suburban and urban areas including, but not limited to Camden, Paterson, Newark, and Trenton.

Get Moving Get Healthy NJ Workforce engaged County employees in a walking program. Participants increased awareness of the importance of sustaining good health with proper nutrition and physical activity, physical activity as a component of healthy lifestyle, and the effect of healthy eating habits, physical activity and stress reduction.

#### Results

Youth learn ways to make healthy eating and physical activity a part of their daily lives, change eating habits by making healthy food choices and now understand the importance of proper nutrition and increasing physical activity. A school nurse from one of the schools where the program was done reported the following, "Thank you very much for your excellent presentation of "Get Moving-Get Healthy." Based on calculated BMI's, 50% of my 5th grade class is overweight/obese. Many of the students are coming to me and telling me about reading labels and changes they are making regarding nutrition. Again, thank you!?"

As a result of the Workforce Wellness Program 53% of participants reported improved physical condition, 68% reported increased consumption of fruit and 63% reported increased consumption of vegetables.

## 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
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**

Promotion of Nutrition, Healthy Lifestyles and Adolescent/Youth Life Skills: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Promotion of Nutrition, Healthy Lifestyles and Adolescent/Youth Life Skills

Obesity in urban communities particularly in children has become a significant public health concern in the United States. The number of adolescents who are overweight has tripled since 1980 and the prevalence among younger children has more than doubled. According to the 1999-2002 NHANES survey, 16 percent of children age 6-19 years are overweight (U.S. Department of Health & Human Services). In 2012 New Jersey reported over 60% of adults were overweight and over 20% were obese while 14% of adolescents (under age 18) were overweight and 10% were

obese. Less than a quarter (21%) of our youth is getting the daily recommended amount of physical activity each day, but over 30% are watching three or more hours of television each day.

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

Students in grades 4-8 and their families who participated in Keansburg Afterschool Program (KAP) at Bolger Middle School in Keansburg, NJ were involved in several educational programs and activities during the course of the academic year and summer programs. Eighty-eight (88) students were enrolled in the KAP. A series of interactive programs, led by FCHS educators who instructed students on the health benefits of including a variety of colorful fruits and vegetables to their daily diet. Taste testing and preparation of various familiar and less commonly known fruits and vegetables were part of activities on healthy snacks. A culminating event, "Jersey Fresh Day" was created in a joint effort between three other Cooperative Extension Departments. Families were provided with educational workshops on locally grown fruits and vegetables as part of a "Jersey Fresh? event.

A ?Community Nutrition and Physical Activity Education and Fun Fair (CNPAEFF)? was held in conjunction with Nickelodeon?s annual Worldwide Day of Play which promotes outdoor physical activity in families.

A 12-week hip hop dance and nutrition program taught youth about healthy living through dance and nutrition. It utilized curriculum from Get Moving-Get Healthy, CANFit, and SNAP-Ed to teach youth about nutrition and physical activity. The youth are responsible for choreographing and presenting dances to an audience comprised of students and their families, afterschool staff, and collaborators.

#### **Results**

As a result of participating in the KAP program, 51% of students said they would share what they learned with other family members, 69% of students said they would try eating fruit or vegetables prepared in a different way than how they normally consume that item.

Families who participated in the CNPAEFF, reported to 4-H staff and volunteers that they learned a lot of new information throughout the day while participating in the various educational stations. Children seemed to enjoy spending time outdoors not only with one another but with other members of their family. Many families were interested in learning if this event would be held again next year. Several educators and parents of school age children inquired with 4-H staff on ways to implement something similar in their schools. The 4-H office received a couple of e-mails/calls from families who heard about the event afterwards and were interested in additional information.

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

<b>KA Code</b>	<b>Knowledge Area</b>
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**

Family Economics: Steps to Health and Wealth: 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
2012	0

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

**Issue (Who cares and Why)**

Family Economics: Steps to Health and Wealth

With passage of the 2010 health care law and high unemployment rates during 2012, much attention was paid to health and personal finances and relationships between both aspects of people's lives. 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**

The Small Steps to Health and Wealth (SSHW) program, created by Rutgers Cooperative Extension, increased its outreach across the U.S. during 2012. Almost a dozen states are in various phases of SSHW program implementation. Each state is collecting and reporting its own

impact evaluation data. Among the most actively involved states currently using the SSHW program are Colorado and Kentucky. Rutgers Cooperative Extension was able to leverage its program outreach significantly by collaborating with program partners in these states.

Sixteen audio podcasts and videos about SSHW content were prepared by Colorado State University and are available on their Web site: <http://www.ext.colostate.edu/smallsteps/> Colorado Extension also launched an active SSHW social media campaign with tweets and Facebook messages about making health and financial behavior changes.

The University of Kentucky developed the SSHW youth curriculum, Building a Healthy, Wealthy Future, which became available to Extension educators nationwide. This provides adaptation of SSHW content and behavior change strategies for youth audiences with an accompanying fact sheet for parents, available on the SSHW Internal Web site at <http://njaes.rutgers.edu/sshw/internal/>.

A three-hour SSHW workshop was presented to USDA employees. NIFA-USDA has selected SSHW to be a "signature" program and is encouraging Extension agents nationwide to implement and evaluate this program. Almost a dozen states are actively replicating this Rutgers-based program.

### **Results**

Behavior changes reported by participants who completed follow-up evaluation forms included, eating healthier foods and increased physical activity.

Over a quarter of respondents from both challenges reported improved spending habits, weight loss, and money saved. Reported weight loss was appropriate for the six-week Challenge with most respondents losing 1-5 pounds. 14% of respondents in both challenges lost 11-16 pounds. Savings accumulations were proportionate to the time period with more than 2/3 of respondents saving under \$300. One in five respondents in both challenges saved over \$500. For both health and financial practices, these initial reported behaviors have the potential for significant impact over time.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

Postharvest Biology of Fruits: 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
2012	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Postharvest Biology of Fruits

Alternative strategies for management of human and agricultural crop diseases is a high priority in research because resistance to standard chemical controls (antibiotics for humans and pesticides for crops) is increasing at an alarming rate, and cost of implementing these control procedures (both in terms of human health care and crop management) is skyrocketing.

#### What has been done

Fruit-rotting fungi can cause significant reductions in both pre and post-harvest fruit quality in cranberries and blueberries. NJAES researchers have isolated levels of anthocyanins, flavonol glycosides and proanthocyanidins over the growing season from each variety of blueberry and cranberry, to determine the differences in the levels of these compounds in the specific varieties that we are testing. NJAES is attempting to target the specific levels of the active compounds that confer anti-fungal activity and relate these levels to those needed for human health promotion.

#### Results

Plants manufacture their own natural defense compounds to help them ward off diseases and pests, giving researchers the opportunity to screen and select certain plants compounds for their disease-prevention and health-promoting properties. Cranberries and blueberries are known to contain certain compounds with antifungal and antibacterial activities (i.e. prevention of urinary tract infections). An active NJAES research project is underway to determine which cranberry and blueberry cultivars contain the highest levels of these compounds at various time-points in the growing season. These levels are being correlated, not only with resistance to costly damage from both pre- and post-harvest fruit-rotting fungi, but also to those levels needed for natural human health promotion. These could serve as targets levels and markers for breeding blueberries and cranberries for enhanced fungal resistance and ultimately improved health benefits and fruit quality, if cultivars with higher levels of these phytochemicals are targeted. Research results will provide updated information to growers on the most suitable fruit cultivars

for postharvest quality, in combination with sensory and health benefit information. Overall results have the potential to be used for reducing pesticide applications on these crops, lowering resistance rates, and providing rich sources of fruit with high levels of active compounds for safer alternatives to health promotion in humans and improved human health as a result of increased consumption of phytochemical-rich fruit.

Another potential outcome is an increase in fruit quality with reduced post-harvest decay in retail store packages.

#### 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

Introducing New Crops, Nutraceuticals and other Value-Added Products: 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
2012	0

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

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

Introducing New Crops, Nutraceuticals and other Value-Added Products

More than 20% of the American population harbor the risk factors defined for metabolic syndrome, a condition that is highly correlated with the development of type-2 diabetes and coronary heart disease.

Additionally, cancer is a major disease affecting a larger portion of the American population resulting in high mortality rates for both men and women.

### **What has been done**

NJAES conducted greenhouse, field and laboratory research studies in new and specialty crops, natural products chemistry, crop improvement, quality control systems; identifying plant products that provide health and nutritional benefit, mentoring graduate students; in teaching Medicinal Plants and Plants and Human Health; and in giving Extension presentations in New Jersey, other states and internationally. Events in which results of research activities were shown and demonstrated included field days at the NJAES research center, Pittstown, NJ, presentations domestically, and internationally. NJAES Researcher continues work with new products research continuing, testing or making advanced selection and breeding lines of improved basil, catnip, and oregano and ethnic crops for health and nutrition and custom designing new aromas.

### **Results**

NJAES researchers also continued to evaluate the nutritional composition and natural products chemistry profile of a wide range of vegetables and herbs. Impact continues to be in the improved quality control of botanicals used for human health and nutrition through a robust focus on natural products chemistry and in identifying the specific natural products that lead to the bioactivity. We made new crosses and created hybrids for disease resistance and chilling tolerance in basil and were successful in making intraspecific crosses. We field tested our high oil and nepetalactone bearing catnip lines as sources of natural pest control agents and completed the development of two new oregano varieties. Internationally, our market-first and scientific-driven models of international development and commercialization have significantly grown and expanded into Liberia, Kenya, Namibia, Tanzania and Zambia. Implemented in sub-Saharan Africa, with the Agri-Business in Sustainable Natural African Plant Products network and others in concert with leadership from Rutgers University and with strong public and private sector partnerships as a catalyst for market development, this program impacted over 10,000 farmers in Ghana, Liberia, Senegal, and Zambia, with focus on African women.

A provisional patent application was filed in 2012 for a natural plant-based extract with anti-Hepatitis C virus activity.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

Assessing and Addressing Individual and Environmental Factors That Influence Eating Behavior of Young Adults: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

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

Assessing and Addressing Individual and Environmental Factors That Influence Eating Behavior of Young Adults

Overweight and obesity are serious problems in the U.S. During the past 20 years, there has been a dramatic increase in obesity in the United States and rates remain high. According to the CDC, in 2010, no state had a prevalence of obesity less than 20%. In 2011, New Jersey had an obesity rate of 31.3% (ref.: <http://www.cdc.gov/obesity/data/trends>).

These are serious health problems that must be addressed. Many of today's health problems--obesity, heart disease, diabetes, and cancer--can be reduced through good nutrition and a healthy life style.

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

This project is built on an integrated set of research activities designed to form the basis of a community-based participatory research (CBPR) intervention to prevent unhealthy weight gain in young adults. This project is part of the multi-state project NC1193 that includes 15 other universities. The long-term project goal of NC1193 is to develop tailored, sustainable

interventions that incorporate environmental supports and recommended campus/local policies to promote healthful eating-behavior of young adult and to reduce the risk of obesity in young adults using CBPR guided by the PRECEDE-PROCEED model. Involving the community directly in the research process helps the community gain awareness of, and interest in the issues that must be addressed to successfully prevent obesity in young adults. This project aims to refine and validate assessment tools and develop a prototype Healthy Campus Index that can be used for planning and evaluation at both the personal and environmental levels of the socio-ecological model. NJ activities completed during the timeframe noted above that contributed to the long-term goals of this project include the following. -Full-scale implementation of the 18-month online intervention (Young Adults Eating and Active for Health [Y.E.A.H] project along with 14 other universities (collection of baseline data, implementation of the intervention, collection of post data). -Trained 11 undergraduate, 2 graduate research assistants, and 1 post doctoral associate to collect study data, conduct anthropometric (height, weight, waist circumference) measurements, take blood pressures, and/or conduct biochemical measurements (blood glucose and lipids). Development and submission of manuscripts and research presentations.

### **Results**

The Y.E.A.H. project is the first to systematically develop and test a tailored, web-based program to prevent excessive weight gain in the 18-24 year old population using the community based research process of PRECEDE-PROCEED. Preliminary analyses indicate that this intervention is on track to promote healthy weights in the target population. Involving the community directly in the assessment of the physical environment in terms of how it advocates and supports physical activity, consumption of healthful foods, and overall health helps the community gain awareness of, and interest in the issues that must be addressed to prevent obesity in young adults.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

Evaluation and Characterization of Novel Botanical Extracts for the Prevention and Treatment of Metabolics Syndrome and Diabetes: 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
2012	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

Botanicals have been used for thousands of years as therapeutic agents for many diseases and human conditions. "Metabolic syndrome" is currently defined as a condition whose major features consist of obesity, insulin resistance, development of Type 2 diabetes and accelerated cardiovascular disease and continues to grow at epidemic proportions.

#### What has been done

NJAES BRC (Botanical Research Center) focuses on botanicals that can be used for the prevention/treatment of metabolic syndrome. Primary research objectives of the BRC as a whole focuses on how the constituents of botanicals affect insulin signaling pathways and improve insulin resistance, the underlying metabolic dysregulation associated with metabolic syndrome. While select species of *Artemisia* are under current evaluation by the BRC, the extract of *Artemisia dracunculoides* L. (PMI-5011) is the most characterized both in terms of its biological activity and its composition of 6 compounds identified as having antidiabetic activity. PMI 5011, has been shown to improve insulin action in vitro and in vivo, but the cellular mechanisms remain elusive. Using differential proteomics, we have studied mechanisms by which PMI 5011 enhances insulin action in primary human skeletal muscle culture. Bioinformatics analyses determined that several metabolic pathways related to glycolysis, glucose transport and cell signaling were highly represented and differentially regulated in the presence of PMI 5011 indicating that this extract affects several pathways modulating carbohydrate metabolism, including translocation of GLUT4 to the plasma membrane.

#### Results

Plants have served as a source of medicinal compounds for thousands of years and the research that we conduct helps to determine how the compounds from medicinal plants are able to provide a biological activity in animals or people. This biological activity would be considered the medical benefit of the medicinal plant. The research conducted with the gastrointestinal model is providing a way for us to determine the proper dose that should be used for upcoming clinical studies and the formulation that will deliver the maximum amount of the medicinal compounds needed for the



medicinal benefit. This research will lead to new alternative strategies for the prevention and treatment of diabetes and should save in health-care expenditures for the State. In addition, the identification of novel plant based preparations for the prevention and treatment of diabetes and metabolic syndrome will be essential for the battle against this growing epidemic. A better understanding of how they work will provide consumers and researchers with information for their most effective use. These efforts contribute to value added agriculture of New Jersey, as well as provide significant benefits to the biotechnology and pharmaceutical industries in the State.

#### 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

Taste Genetics, Food Choice and Obesity: 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
2012	0

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

**Issue (Who cares and Why)**

### Taste Genetics, Food Choice and Obesity

Obesity is a serious problem in the U.S. within NJ, the obesity rate is over 30%. Good nutrition and healthy lifestyles can impact health status and weight gain.

#### What has been done

NJAES research on human food selection links genetic variation in bitter taste perception to food preferences, dietary habits and body weight. The long-term goals of this project are to better identify individuals, especially women, who may be at risk for excess weight gain and obesity due to dietary causes. Taste blindness to the bitterness of 6-n-propylthiouracil (PROP) is a recessive trait that is controlled, in part, by the bitter receptor gene, TAS2R38. Those with the non-taster phenotype are less responsive to a range of oral sensations (fats, alcohol, bitterness and pungency) and have increased preferences for foods with these qualities, whereas those with the taster phenotype (medium- or super-tasters) show the opposite responses. Some studies suggest that PROP non-tasters habitually consume more added fats, and energy as compared to PROP tasters. This dietary pattern could contribute to greater BMI, which we have observed among middle-aged, PROP non-taster women. It is known that exposure to a variety of high-fat/energy-dense, foods increases energy intake by 14-25% and could be a precursor to weight gain. In a 3-day buffet feeding experiment we previously showed that non-taster and medium taster women consumed more daily energy, more saturated fat and cholesterol and more servings/day of added fats and pastries. These data imply that differences in the selection of dietary fats may contribute to body weight differences among PROP taster groups. However, no studies have investigated caloric compensation in women classified by PROP status. Therefore, we investigated if non-taster women would compensate less accurately for the calories in a high-fat soup preload in a subsequent test meal compared to super-taster women. Energy intake from a test meal was measured in 75 healthy non-diet-restrained, lean women 30 min after the ingestion of a high-fat soup preload (0.8 Kcal/g), calculated to represent 10% of resting energy expenditure for each subject, or the same volume of water. Subjects ate an ad-libitum buffet lunch in the lab on two occasions (6 washout days). There were no differences in energy intake or macronutrient selection among taster groups in the water condition. After soup, non-tasters consumed more energy and fat, and less carbohydrate from the test meal than ST. Caloric compensation in the test meal was somewhat less precise ( $p < 0.08$ ) in non-tasters (86%) compared to medium tasters (99%) and super-tasters (104%).

#### Results

These data suggest that a modest overconsumption of fat coupled with a modest decrement in short-term energy compensation for fat may both contribute to positive energy balance and increased adiposity in non-taster women. Future studies will address the regulatory mechanisms involved.

#### 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**

Sustainable Me: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

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

Sustainable Me

According to the Centers for Disease Control (CDC), more than one third of U.S. adults, more than 72 million people, and 17% of children are obese. From 1980 through 2008, obesity rates for adults have doubled and rates for children have tripled. The obesity rates for all groups in our society, regardless of age, sex, race, ethnicity, socioeconomic status, education level or geographic region, have increased. The CDC further states that the health consequences of obesity are numerous, including heart disease, Type 2 diabetes, various cancers, high blood pressure, high cholesterol and other conditions.

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

Sustainable Me was created as a means of engaging middle and high school students in a school-based event that takes existing knowledge of healthy lifestyle and physical activity and improves the retention of learning after the event. The event is used to enhance the existing school wellness program. Sustainable Me is a highly interactive wellness event that can be held during school hours, or as part of after-school program. Students are the participants in this healthy lifestyle activity that features a series of highly interactive mini-lessons (for 60 minutes).

**Results**

1,117 students who completed the two-week follow-up survey reported : 37% increased consumption of fruits and vegetables, 36% controlled portion sizes, 53% increased physical activity to 60 minutes per day, 50% decreased screen time on TV/computers/video games, 54% said - I changed my behavior because I know that disease prevention is important to living a healthy lifestyle, I drink sugar-sweetened beverages 44% less than 2 weeks ago.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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 #13**

**1. Outcome Measures**

Seeds to Success Youth Farmstand: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Seeds to Success Youth Farmstand

Special needs and at-risk youth live in communities facing generational poverty and the concurrent challenges of such poverty. 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).

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

Seeds to Success prepares at-risk, special needs youth for the workforce and life through classroom and on-the-job training. During the school year, youth participate in nutrition, food safety, money management and banking education. During the summer, students work at youth farmstands. Three farmers were able to expand their market by selling approximately \$7,000 of produce to the farmstand. One urban-aid community benefitted, by gaining access to locally grown, nutritious produce. Low-income residents and seniors can purchase this produce with their WIC and Senior farmstand vouchers, which accounts for 11% of summer farmstand sales.

#### **Results**

As a result, of the 243 students who completed both pre- and post-testing, the following outcomes were achieved: 1) the percentage of students who could identify the healthier food among five sets of 2 food labels increased from 58% (pre-test) to 79% (post-test). 2) the percentage of students who could identify which of 6 fruits did not grow in New Jersey increased from 32% (pre-test) to 71% (post-test). 3) the percentage of youth who were able to identify which fruits and vegetables were grown locally increased from 56% (fruits) and 52% (vegetables) to 81% (fruits) and 77% (vegetables).

Extensive evaluation was conducted with youth. Statistical analysis revealed that there were significant improvements ( $p < .05$ ) in youth's ability to apply USDA recommendations to use color as a guide to increase variety in the diet by identifying the types of fruits and vegetables that were better sources of key nutrients. Significant improvements ( $p < .05$ ) also noted in youth's ability to practice safe food handling practices.

When asked how this program impacted their health lifestyles, youth responded that, as a result of this program: 85% of participants indicated that they will do something new or different; 75% of participants indicated that they plan to use or share what they learned; 68% indicated that they are more interested in nutrition; 64% of participants indicated that they will change the way they think, act or behave.

Seeds to Success yielded a number of conditional changes: created one retail outlet and economic development in an urban-aid community (Glassboro); created 5.24 FTEs in one urban-aid community, resulting in improved quality of life; enabled 8 special needs youth to acquire permanent jobs outside of the farmstands; improved food security and nutritional wellbeing for Seniors, WIC clients and SNAP recipients by increasing access to fresh produce that could be purchased via WIC Farmers' Market Nutrition Program (FMNP) vouchers and Supplemental Nutrition Assistance Program (SNAP) benefits.

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

<b>KA Code</b>	<b>Knowledge Area</b>
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

**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**

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

**Evaluation Results**

See Qualitative Outcomes.

**Key Items of Evaluation**

See Qualitative Outcomes.

**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%	
	<b>Total</b>	100%		0%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	30.0	0.0	1.0	0.0
Actual Paid Professional	30.1	0.0	0.0	0.0
Actual Volunteer	3099.0	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
437927	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1237763	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
568493	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 used Creating Healthy Communities CoP.

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

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	2336	87111	55778	261332



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

**Patent Applications Submitted**

Year: 2012  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2012	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
2012	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	4-H Science Engineering and Technology: 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.
5	National Partnerships for After School Science (NPASS) - NJ: 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.
6	New Brunswick 4-H Program ? Engaging Urban Youth: 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.
7	Horticulture Therapy with Incarcerated Youth: 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.
8	New Jersey 4-H Equine Programs: 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.
9	Youth Leadership Development: 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.

**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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

NJ 4-H Youth Development

Youth are at risk for negative outcomes: poor health, substance abuse, school failure, crime and violence. Youth need experiences which allow them to acquire knowledge, skills and behaviors to lead to a fulfilling life.

**What has been done**

Rutgers Cooperative Extension 4-H Youth Development Program used a learn-by-doing approach to enable youth to develop by providing opportunities to connect to their communities and adult leaders. Programs are focused on the mission mandates of science, engineering, technology; citizenship and healthy lifestyles.

**Results**

In 2012, 55,778 youth (duplicates eliminated) participated in the following ways: 10,849 youth were members of organized 4-H clubs, 10,825 youth were members of 4-H special interest/short-term programs, 3,457 youth participated in camping programs, 31,156 youth were involved in 4-H school enrichment programs, 29 youth participated in 4-H individual study programs, 1,118 youth participated in School Age Child Care education programs.

Volunteers are essential to the successful delivery of 4-H programs to youth. This year 2,777 adult volunteers donated, on average, 220 hours per year preparing for club meetings and teaching youth. According to the Independent Sector, the value of volunteer time in New Jersey in 2010 was \$25.64/hour. This equates to more than \$15.6 million in time being donated to New Jersey 4-H. There were also 322 4-H youth volunteers, teens who shared their skills with younger 4-H members and with other youth in their communities.

An in-depth study by Tufts University has discovered that, when compared to other youth, young people involved in 4-H: have higher educational achievement and motivation for future education, are more civically active and make more civic contributions to their communities.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	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**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

## **Outcome #4**

### **1. Outcome Measures**

4-H Science Engineering and Technology: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

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

4-H Science Engineering and Technology

Research estimates only 17% of 12th graders are prepared for and interested in pursuing STEM degrees. The ability of the U.S. to remain competitive in the global economy depends largely on increasing the number of qualified STEM graduates (NAS 2007).

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

The 4-H Rutgerscience Saturday program is designed to enrich young people's interest and competency in science, technology, engineering and mathematics by having direct interaction with Rutgers University faculty, graduate, and undergraduate students.

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. Using an action planning process, youth develop community service projects to demonstrate their knowledge of climate change and their creativity in addressing sustainability issues.

The 4-H Summer Science program is designed to enrich young people's interest and competency in science, technology, and communications by having direct experiences with Rutgers University faculty, graduate and undergraduate students. The program creates and supports 4-H Science, Engineering & Technology (SET) Ambassadors who share their

experience, new knowledge, and understanding of SET topics and campus life with other students in their community through employment and/or volunteer opportunities through local 4-H offices.

### **Results**

As a result of the Climate and Environmental Change Teen Summit program, participants felt empowered to be leaders within their communities and that environmental issues (such as climate change) 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. Along with positive changes in perception, the end of program assessments also indicated an enhanced understanding of climate science and mitigation strategies. 98% of youth reported that their understanding of the science and scientists involved in climate change research improved after the program. Students also reported they had a better understanding of how they can make positive changes to reduce climate change.

The 4-H Summer Science program data shows positive shifts in young peoples' perception of their own participation in science. Pre and Post test results show youth are more interested in working with scientists to solve problems and learning about new science discoveries. The camp also increased participants' perception of science as exciting and that they as students of science are good at it and can learn science.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

### **Outcome #5**

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

National Partnerships for After School Science (NPASS) - NJ: 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
2012	0

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

**Issue (Who cares and Why)**

National Partnerships for After School Science (NPASS) - NJ

School test results show that a large number of youth in New Jersey are not proficient in the areas of math, science and technology. In addition, many boys and girls are afraid or apprehensive about doing science-related activities. Given these facts it is important to focus on the National 4-H Initiative of Science, Technology and Engineering by providing educational programs that provide an opportunity for youth to explore and learn about science and technology in a positive, non-threatening, hands-on and fun environment.

**What has been done**

During the 2011-2012 school year, the 12 Out-of-School Time (OST) Science Trainers delivered 35 Design It/Explore It workshops throughout the state for frontline afterschool staff from collaborating sites. A total of 144 workshops were presented in New Jersey over the course of the three-year project. Based on a rubric developed by the program's external evaluators, New Jersey has the second highest implementation rate of the eight participating states.

Design It! Explore It! provides the core strategy and activities for staff training, afterschool, and summer day camp programming. The engineering design projects are a series of age appropriate challenges that incorporate a problem solving process.

**Results**

Participants in a Design It! Explore It! Series had the following results: direct teaching at Mizpah Community Center (new outreach site for 4-H) during summer day camp to youth (2.5 hours/week for 6 weeks). Projects included Wiring a House, Trebuchets, and Balls and Tracks. 91% stated that getting to do hands-on engineering activities was one of their favorite workshops during Summer Day Camp, 87% reported they feel more capable of problem solving and making changes to improve performance (engineering project), 86% had higher overall attitude about engineering and science (as related to school), 79% increased interest in engineering, 64% improved skills in working as part of a team, and 43% felt they had better relationships with the staff and counselors as a result of working on the projects together.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
806	Youth Development



**Outcome #6**

**1. Outcome Measures**

New Brunswick 4-H Program ? Engaging Urban Youth: 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
2012	0

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

**Issue (Who cares and Why)**

New Brunswick 4-H Program ? Engaging Urban Youth

Latino youth in New Jersey, and New Brunswick and, are at great risk due to their poverty and challenges with educational achievement. National research indicates that 29% of early adolescents do not have the opportunity to access community youth programs and that 4-H is typically less prevalent in poor neighborhoods (U.S. Department of Education, 1990), which demonstrates that there is a clear need for focused 4-H programming in poor urban neighborhoods.

**What has been done**

In 2012, efforts to expand the New Brunswick 4-H program, plan for sustainability and provide for integration into the county 4-H program were achieved. The urban 4-H club model was modified to meet the needs of the youth and adults in the community, additional collaborations were formed with local agencies and organizations, Americorp staff were utilized as program staff and volunteers, Rutgers University students were placed in various internship and volunteer positions, and ongoing advisory committees were utilized for program support.

**Results**

Over 30 adults, community leaders, partners, and Rutgers University students have been trained to serve as volunteers. Eight (8) AmeriCorp staff have worked with the 4-H program assisting with recruitment and promotion, registration, parent communication and life skill education. Five

Rutgers University students have assisted with program development.

A Program Advisory Board has been established and has been meeting for the past year. This Advisory Board includes club leaders, Americorp members and community partners and it's goal is to provide guidance and direction for the New Brunswick 4-H program and to assist with fundraising efforts to support club projects, program promotion and outreach. Advisory Board members also provide special interest workshops and educational resource support to 4-H clubs. New Brunswick 4-H youth are actively participating in county and state level 4-H programs

Retrospective pre-post surveys were conducted with 4-H youth. Survey results indicated an increase in self-perceived ability to plan and set goals, make wise decisions, be responsible, listen to others, work on a committee or team and work cooperatively with adults. The greatest increases were in the areas of goal setting, decision making and cooperation. Almost 100% of youth indicated they had a high level of skill in accepting differences at the start of the 4-H and there was no change at the end of the 4-H year. Youth also indicated that their ability to be involved in, and lead community service projects increased at the end of the 4-H year.

Due to an 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 now a sustainable process in place for recruitment and retention of 4-H youth and adult volunteers.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

#### Outcome #7

##### 1. Outcome Measures

Horticulture Therapy with Incarcerated Youth: 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
2012	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Horticulture Therapy with Incarcerated Youth

The Union County Juvenile Detention Center houses youth awaiting judicial proceeding and or more permanent placement in the state corrections system. The majority of the youth have lead impoverished lives. Regardless of their background this time of incarceration is a stressful period for these adolescents. Alleviating their anxiety and helping them develop skills for their release is of critical importance.

#### What has been done

4-H has created a horticulture therapy program for the youth. The objectives of the program are to introduce them to the therapeutic elements of horticulture and to instill in them the life skills of persistence and perseverance. On a regular basis the Rutgers Cooperative Extension Program of Union County meets with the youth to plan, plant and maintain a horticulture therapy area. In the area ornamentals are grown and then given as gifts to their visitors. Additionally, produce is grown in the garden and used as the focal point of nutrition lessons.

#### Results

The program is well supported by the administration of the Union County Human Services Department, which is pleased with its accomplishments. Approximately 35 youth have participated in the program. The youth involved with the program participate in it readily. In fact the program is so satisfying that it is offered as a reward to the best behaving residents. Public and private partnerships have worked to provide support to the program.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

#### Outcome #8

##### 1. Outcome Measures

New Jersey 4-H Equine Programs: 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
2012	0

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

**Issue (Who cares and Why)**

New Jersey 4-H Equine Programs

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 2012. Youth in grades 1- 13 from almost every county in the state can and do participate in the project to some extent. Many of these youth are involved because they love horses and want to work with these animals in some capacity. 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**

State 4-H events include 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 2012, all but the Horse Judging team placed within the top 10 states in that contest.

**Results**

Youth participants in the State 4-H Horse Show completed an evaluation. Results of the evaluation revealed that, 15% of the respondents reported learning more about horse care during this event, 7% reported learning sportsmanship skills, 8% reported learning character traits of responsibility, respect, team work and patience. When asked to list how they will use the information learned in the future, 6% reported they will use this knowledge at future horse shows or horse related events like Hippology, 6 % said they will use life skills for school, work and college. When asked if they want to learn more 73% responded yes. When asked to rate the program 79% rated it as Very Good or Excellent.

Youth who participated in the Model Horse Show reported an 158% increase in knowledge gained from the program. 87% of those youth would like to learn more and plan to participate again. Youth who participated in the State 4-H Horse Bowl reported increased knowledge gains of 130%. 94% of those youth want to learn about more and participate again. Youth who participated in the Equine Presentations program reported an increase in knowledge of 167% and 100% of those youth want to learn more and participate again.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
806	Youth Development

## **Outcome #9**

### **1. Outcome Measures**

Youth Leadership Development: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

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

Youth Leadership Development

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**

Aligned with the 4-H Mission Mandate of Citizenship, 4-H youth participated in the eight week Rutgers 4-H Summer Teen Leadership Institute in Cape May County, focused on leadership and learning experiences through a variety of service, teaching and social activities.

The 4-H Public Presentation Program provided the opportunity for youth to develop a skill that will last a lifetime.

The North Jersey 4-H Teen Conference (NJTC), a 3-day educational program coordinated by teens from the 10 counties in northern New Jersey provided an opportunity for youth to work together, increase life skills, gain greater self-awareness, team work and communication skills.

The Ethics/True Colors program in Atlantic County was provided to all new 4-H members and volunteers and expanded to school sites. Participants complete a personality ID assessment and learn how to work with and understand other people. Information on the six pillars of character and ethical decision making is also included in the program.

A program focused on exploring leadership styles, roles, ethics leadership, conflict management and group diversity, and verbal and non-verbal communication through interactive lessons.

### **Results**

Rutgers 4-H Summer Teen Leadership Institute evaluation revealed that, 89% of institute participants rated the quality of their overall experience from good to excellent, 88% stated that they agreed to strongly agreed that learning to set goals was an important part of becoming a successful leader. After the institute, 78% stated that they would continue to practice goal setting. 100% stated that they improved their leadership skills in the following areas: understanding self, communicating, managing projects, getting along with others, and learning to learn. 78% improved their decision-making skills, and 89% improved their abilities to work with groups. According to longtime nature center teacher Sue Slotterback, the changes made to the program in 2012 resulted in a positive impact on the center's day camp program. "Our teen leaders' abilities to supervise and educate our day campers greatly improved with the new emphasis on leadership skills development in 2012," she stated.

Youth participants in a 2012 county-wide 4-H Public Speaking Contest, end-of-Program evaluations revealed the following results: 90% indicated that they learned self-confidence by participating in the 4-H Public Speaking Contest, 88% indicated that they learned communications skills by participating in the 4-H Public Speaking Contest, 64% indicated that they learned the ability to think clearly and quickly by participating in the 4-H Public Speaking Contest.

In 2012, planning committee members indicated the following skills learned or gained as a result of their participation in the conference: 86% gained the ability to work effectively in partnership with adults, 86% gained leadership skills, 100% gained communication skills, 95% gained better teamwork skills, 86% gained responsibility.

2012 teen planning committee members commented that as a result of NJTC they will: "Share all the new things I learned with my clubs." "Use what I learned this year to be successful next year." "Join more events and use the planning skills I learned to help me in life."

Surveys show that as a result of the Ethics/True Colors program, participants felt they understand themselves better and therefore can understand and work with others better, learned about character building and the six pillars of character, and learned ways to improve their decision making processes. The surveys indicated the following: 98% of participants feel they understand themselves better, 94% of participants feel they understand and can work with others better, 94% of participants understand the characteristic everyone should live up to, 90% of participants know ways to improve their decision making process to make ethical/right decisions.

Post-tests show that as a result of the Teen Leadership Program, participants are more confident and aware that they have the capacity and tools to be a leader, understand what leadership is and what styles of leadership there are. The post-tests indicated the following: 100% of participants feel more confident they can be a leader, 99% of participants know and understand their leadership style, and 91% of participants plan to share the information and knowledge with other teen groups/clubs using the teens-teaching-teens model. Participants noted the following: "I want to be a leader in my classroom and clubs now because of what I have learned." "I learned throughout this class that leaders just aren't born, you can become a leader and use

anywhere.?

#### 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

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

##### Evaluation Results

See Qualitative Outcomes

##### Key Items of Evaluation

See Qualitative Outcomes

**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	25%		25%	
211	Insects, Mites, and Other Arthropods Affecting Plants	15%		15%	
215	Biological Control of Pests Affecting Plants	30%		30%	
601	Economics of Agricultural Production and Farm Management	20%		20%	
604	Marketing and Distribution Practices	10%		10%	
	<b>Total</b>	100%		100%	

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

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

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	65.0	0.0	36.0	0.0
Actual Paid Professional	36.5	0.0	18.9	0.0
Actual Volunteer	759.0	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
1134363	0	1516021	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
3386469	0	4951544	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
417322	0	2060578	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?**

Cover Crops  
 High Tunnels  
 Organic Farming  
 Faculty answered ask an expert questions and developed collaborative educational products.

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

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	77819	38818	9829	0

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

**Patent Applications Submitted**

Year: 2012  
 Actual: 25

**Patents listed**

200800022  
 201200477  
 201200103  
 201200099  
 201200102  
 201200098  
 201100393  
 2012200022  
 20120026  
 201200019  
 201200123  
 201200444  
 201100363  
 201200445  
 201200446  
 201200020  
 200700168  
 200700266  
 200700267  
 200700371  
 200700185  
 200800167  
 200800034  
 61/631,543  
 PP22,541

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

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
Actual	38	104	142

**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
2012	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	Farm Business Management for Female Operators: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.
5	Resistance Management for Fresh-Market and Processing Vegetable Crops in New Jersey: 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.
6	Nuances of Marketing Ethnic Specialty Vegetables & Herbs: 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.
7	Epidemiology and Management of Stone Fruit Diseases: 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.
8	Conservation and Utilization of Plant Genetic Resources: 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.
9	Breeding and Germplasm Enhancement for New Jersey Cranberry and Blueberry Industries : 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.
10	Turfgrass Breeding and Evaluation: 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.
11	Genetic Improvement of Woody Plants (Tresst and Shrubs) for Ornamental Uses: 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.

**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

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2012	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
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

**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
2012	0

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

**Issue (Who cares and Why)**

Agritourism Outreach and Education

The business of making farms travel destinations for education and recreational purposes is critical to ensuring the viability of agriculture in the state in the future.

**What has been done**

NJAES research uncovered some of the success strategies farmers' markets/agri-tourism operators would initiate to sustain and expand capacity utilization. An Internet survey of consumers residing in Delaware, New Jersey, and Pennsylvania was conducted between June 21 to 29, 2010 to capture consumer purchasing behavior and other characteristics relating to visiting agri-tourism operations and shopping from direct (farmer-to-consumer) market outlets in the Northeast. Results from this study show that bundling of farmers' markets activities/site attributes is a workable business strategy.

**Results**

Segmentation/customer profiling stands out as a valuable piece of information that farmers'

markets/agri-tourism business operators could use to position them better for the future. The business operators now know who their customers are and what it takes to attract them. The regression results show that a number of socioeconomic variables are related with the patronage experience. The study finds that there is potential for generating activity all year round by bundling attributes/activities to tap on a wider market beyond traditional fresh produce buyers.

Research conducted by Rutgers NJAES has shown that 1 out of every 5 New Jersey farms is engaged in agritourism, generating an estimated \$57.5 million in annual revenue statewide. The work of the NJAES team is enhanced by its partnership in a multi-state initiative known as the East Coast Agritourism Working Group.

Agritourism helps to diversify product lines and markets; allows direct feedback from consumers about preference for products and services; and creates a "culture of understanding" for what it takes to be a commercial farmer - thus, reducing conflicts over farm practices and strengthening public support for the existence of farms.

#### 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
2012	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
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**

Farm Business Management for Female Operators: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
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2012

0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

##### Farm Business Management for Female Operators

According to the 2007 Census of Agriculture, released in 2009, the average age of farmers in both NJ and nationwide is 57.1 and 30% of U.S. farm operators are women. Thus, a need exists to prepare farm families for retirement and later life farm business transitions and to enhance the business and financial management skills of female farmers. Female farm operators are a unique programming niche because they have increased in frequency (often as a result of widowhood) and may not have had as much experience or business management training as male farmers. Knowledge and skill-building are needed on business and personal financial statements, estate planning, product pricing and marketing, and more.

#### What has been done

Extension Specialists and Agents continued to maintain, promote, and provide content updates for two online courses that provide personal finance content targeted toward farm families: Rutgers Cooperative Extension's Later Life Farming course Web site <http://laterlifefarming.rutgers.edu/> (almost 300 unique visitors in 2012) and the eXtension Investing for Farm Families course Web site <http://www.extension.org/pages/23204/investing-for-farm-families>. Annie's Project-NJ team members to deliver three seven-week series of the Annie's Project farm business management program for women during 2012. The course used a combination of face-to-face and distance education programming to reach participants

In addition, the Women in Agriculture: Challenges and Opportunities conference delivered risk management educational opportunities to women in the mid-Atlantic region. This program focused on areas of risk and provided women the knowledge and tools to better manage their agribusinesses and their risk.

#### Results

Evaluation results of the Annie's Project revealed that: 97% developed a mission statement, 92% developed their business description, 64% wrote a farm description to be used for marketing (or another purpose), 70% have developed a management plan, 68% have developed a production plan.

Women in Agriculture: Challenges and Opportunities conference participants gained knowledge of risk management, farm production, social media outlets, and business management through the use of educational seminars, motivational speakers, and networking.

### 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**

Resistance Management for Fresh-Market and Processing Vegetable Crops in New Jersey: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

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

Resistance Management for Fresh-Market and Processing Vegetable Crops in New Jersey

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. Vegetable growers in NJ, as well as, the rest of the mid-Atlantic region need more information on fungicide chemistries (i.e. modes-of-action, FRAC codes) in order to manage fungicide resistance development properly.

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

Since 2007, ~15,000 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 2012 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 ([www.njveg.rutgers.edu](http://www.njveg.rutgers.edu)) and other state experiment station websites.

**Results**

Growers stated they were willing to use the fungicide resistance management guide in everyday decision making when applying fungicides for disease control and fungicide resistance management. Although no formal survey was done in 2012, 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**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

Nuances of Marketing Ethnic Specialty Vegetables & Herbs: 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**

<b>Year</b>	<b>Actual</b>
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2012

0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Nuances of Marketing Ethnic Specialty Vegetables & Herbs

Census data predictions from 2005 and 2010 indicate, by 2050 non-Caucasian Americans may form 50% of the population within an American population of over 300 million residents. Growing ethnic populations of first- and second-generation immigrants in the Mid-Atlantic Region and along the East Coast, offer farmers marketing opportunities to provide fresh produce native to these groups' homelands. Asian and Hispanic populations are growing at rapid rates in the region, and specialty groceries and restaurants are increasing to serve ethnic foods to both the ethnic populations and the general public. Providing the fresh produce common in these cuisines is an additional niche for fresh produce growers.

#### What has been done

NJAES researchers studied ethnic communities and consumers, purchasing habits and food selections and identified potential crops that can be grown successfully and profitably in Mid-Atlantic and East Coast regions, evaluated specific crops and production systems suitable for local farms, and conducted field demonstration-research trials. Ethnic Crop summaries were presented at farmer twilight meetings and regional conferences (NJ, PA, NY), updated and increased resources available on worldcrops.org website.

Three new farms have been established in Atlantic County producing ethnic crops. Three existing Asian farmers have expanded their operations and markets based on opportunities presented through this program. Likewise, several existing vegetable growers in and around Atlantic County have adopted new ethnic crops and expanded their markets.

#### Results

Survey of 80 Central Jersey vegetable growers indicated an increase of ethnic specialty crop production over the past two years.

### 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**

Epidemiology and Management of Stone Fruit Diseases: 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
2012	0

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

**Issue (Who cares and Why)**

Epidemiology and Management of Stone Fruit Diseases

To remain competitive in national and international markets, breeding programs must constantly provide growers with new and improved cultivars that are adapted to local growing conditions and markets. Climate conditions can seriously limit yields for growers, and contribute to many fungal and bacterial diseases. Control of diseases requires timely and costly application of pesticides, thereby increasing the environmental impact of the agricultural production system on the surrounding areas.

**What has been done**

NJAES researchers conducted studies on use of biorational materials for management of brown rot and on the importance of cover sprays for preharvest brown rot control; examined efficacy of improved reduced risk conventional fungicides against all peach diseases; evaluated and compared Japanese plum cultivars for resistance to bacterial spot; examined novel copper formulations for peach bacterial spot control. Published mathematical model describing the sporulation of *Fusicladium carpophilium* causal agent of peach scab.

All spray guides (peach, plum, cherry, apple, and pear) in the 2012 New Jersey Commercial Tree Fruit Production Guide (E002) were updated to include new information on fungicides and bactericides to control tree fruit diseases; included information on relative efficacies and application rates for each individual disease.

In vitro studies were performed to quantitatively characterize the ability of three organic / biorational fungicides to control the growth and spore germination of *Monilinia fructicola*, causal agent of brown rot on stone fruit. This disease can cause 100% fruit loss if not properly managed.

### Results

During spring of 2012, a single peach tree in a commercial NJ orchard was observed to have unusual symptoms that resembled Peach Mosaic Virus. During the 1950s, this contagious disease caused significant yield loss and removal of tens of thousands of trees from southern CA and throughout the southwest. Fortunately, specimens sent to the USDA-ARS for identification confirmed that the malady was not peach mosaic virus. A major crisis was averted; no further action required. To date, the symptoms were believed to be caused by a chimera (a natural mutation); the afflicted tree was removed.

Outbreaks of resistant pathogens have been and continue to be reported in many other peach growing regions. New Jersey growers adjusted fungicide usage to maintain brown rot disease control and simultaneously prevent or delay further resistance development. Although 2012 was a record year for blossom blight development, grower awareness of the resistance threat allowed them to take pre-emptive action in their disease control programs; no commercial economic losses were observed.

Second year of data of bacterial spot indicated some newer products do provide better control; however, phytotoxicity to tree foliage needs to be addressed further before recommendations can be made to growers.

Growers can use announced peach rusty spot findings to select new cultivars for planting that have a higher degree of disease resistance (therefore reducing amount of fungicide spraying in future years).

Production guide ? grower feedback continues to be good; many new products were added to the latest guide; online publication has broadened its use considerably.

## 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**

Conservation and Utilization of Plant Genetic Resources: 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
2012	0

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

**Issue (Who cares and Why)**

Conservation and Utilization of Plant Genetic Resources

To remain competitive in national and international markets, breeding programs must constantly provide the growers with new and improved cultivars that are adapted to local growing conditions and markets. Weather related factors, such as severe cold outbreaks in the winter and late frosts in the spring, can seriously limit yields for growers. Furthermore, the warm and humid summers in the eastern US are conducive to many fungal and bacterial diseases on peach, apricot and apple. Control of these diseases requires the timely and costly application of pesticides, thereby increasing the environmental impact of the agricultural production system on the surrounding areas.

**What has been done**

NJAES researchers and Extension agents continue to develop peach, apricot, and apple cultivars with improved disease resistance and adaptation to their growing environment. The major objective of the apricot (*Prunus armeniaca* L.) breeding program is to develop apricots with improved eating quality and broader range of adaption. This spring we made 15 apricot crosses in the greenhouse using Central Asian and Chinese germplasm, yielding 403 seeds. The focus of

our peach and nectarine [*Prunus persica* (L.) Batsch] crosses this year was to develop early ripening cultivars with large, firm fruit that soften slowly, and are tolerant to bacterial spot (*Xanthomonas campestris* pv. *pruni*). Seven hundred thirteen apricot and 3,500 peach seedlings were transplanted to the field in 2012. The major objective of the apple (*Malus Xdomestica* Borkh.) breeding program is to develop high quality desert apples with durable resistance to apple scab (*Venturia inaequalis*). Fourteen crosses yield a total of 2,139 seeds. Seedlings produced from these crosses will be screened for resistance to apple scab in the greenhouse.

### Results

Over the course of this work, many peach, apricot, and apple selections have been distributed to researchers, growers, and nurseryman for further testing. During this reporting period, a patent application was filed for one apricot selection that is being propagated for release to fruit growers. Information about this and other new varieties is disseminated by presentations at grower meetings, variety showcases, newspaper articles, publications in professional journals, and published patents. Many new cultivars have been released commercially to the public.

## 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

Breeding and Germplasm Enhancement for New Jersey Cranberry and Blueberry Industries : 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
2012	0

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

**Issue (Who cares and Why)**

Breeding and Germplasm Enhancement for New Jersey Cranberry and Blueberry Industries

Alternative strategies for management of human and agricultural crop diseases is a high priority in research because resistance to standard chemical controls (antibiotics for humans and pesticides for crops) is increasing at an alarming rate, and cost of implementing these control procedures (both in terms of human health care and crop management) is skyrocketing.

**What has been done**

In 2012, 35 blueberry crosses were made to transfer aphid resistance found in the evergreen Florida blueberry into the northern highbush blueberry, and 38 crosses were made among our best selections focusing primarily on machine harvestability traits. Over 1,400 advanced selections were evaluated for early and late season, machine harvestability, and fruit quality.

NJAES results were presented at the American Society for Horticultural Science regional and national meetings, and to several hundred growers at Workshops 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 including Atlantic Blueberry Co., Variety Farms, Pine Island Cranberry Co., Makepeace Cranberry, Cutler Cranberry, Lee Brothers, J.J. White, and Integrity Propagation.

**Results**

New propagation methods developed by this work have optimized the production of healthy, disease-free, true-to-type cranberry stolons, providing for the first time virus-indexed and DNA fingerprinted cranberry varieties for the cranberry grower. Over 1,900 acres of the Crimson Queen, Demoranville, and Mullica Queen varieties have now been planted in five states (MA, NJ, OR, WA, WI), and four provinces in Canada. Fact sheets on each of the varieties have been written and are being distributed to cranberry growers. The higher yield and fruit quality of the new cranberry varieties will contribute to higher productivity in food provision. The greater productivity of these varieties will increase the efficiency of US cranberry growers, enhancing US agricultural sustainability. The development of varieties with increased disease and insect resistance will reduce requirements for pesticides, resulting in reduced environmental impact, and safer food and water supply. US Plant Patent PP22,541, Cranberry variety CNJ95-20-20 (Scarlet Knight), was issued Mar 6, 2012.

**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

**Outcome #10**

**1. Outcome Measures**

Turfgrass Breeding and Evaluation: 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
2012	0

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

**Issue (Who cares and Why)**

Turfgrass Breeding and Evaluation

Turfgrass is a valuable and rapidly expanding component of our urban and rural landscape. Turfgrass is used to stabilize soil and enhance our environment, offer recreation and enjoyment for millions of Americans as well as green space in urban environments.

**What has been done**

During 2012, there were 9,746 new turfgrass plots established with over 74,070 spaced plants in nurseries and over 8,000 mowed single-clone selections established. In 2012, there were 246,000 seedlings from intra and inter-specific crosses of Kentucky bluegrass screened under winter greenhouse conditions and the superior plants were planted in the field in the spring of 2012. In the winter of 2011-2012, screening was conducted on single plants of 20,000 tall fescues, 10,000 Chewings fescues, 18,000 hard fescues, 50,000 perennial ryegrasses and 10,000 bentgrasses under winter greenhouses conditions. The superior plants of all these species were put into spaced-plant nurseries. Over 250 new intra and inter-specific Kentucky bluegrasses were harvested in 2012. Six graduate students have been involved in this breeding

project. There were over 800 stakeholders attending 2 field days with over 10 different cool-season species of turfgrasses being displayed with over 1,300 individual variety turf plots labeled. Over 21 lectures were presented by the authors in 2012. Eight refereed journal articles and 11 non-refereed articles were published or in press in 2012.

### **Results**

There were over 1,500 new germplasm sources of cool-season germplasm collected in Europe and North Africa in 2012 that were sent as seed to New Jersey. These new germplasm sources continue to contribute new sources for resistance to stem and crown rust and gray leaf spot in perennial ryegrass. New bentgrass and tall fescue germplasm has contributed new sources of brown patch resistance. A new Kentucky bluegrass from Romania has shown excellent resistance to rust and summer patch. These should all require less fungicides to provide persistent turf cover. The development work from selecting new wear tolerant turfgrasses should provide safer playing fields and playgrounds. Perennial ryegrasses and tall fescues are now being widely used on golf courses and landscapes.

During 2012, there were 16 US Plant Variety Protection (PVP) applications made and 8 PVP's were issued. There were 4 new Kentucky bluegrasses, 3 new tall fescues, 11 new perennial ryegrass, 3 new strong creeping red fescues, 2 new hard fescues and 3 Chewings fescue named and increased in 2012.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

Genetic Improvement of Woody Plants (Trees and Shrubs) for Ornamental Uses: 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
2012	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Genetic Improvement of Woody Plants (Trees and Shrubs) for Ornamental Uses

The Nursery industry is in need of new plants for ornament purposes that are adapted to the specific climate and conditions of the U.S. These plants need to be disease and pest resistant as well as attractive and hardy to meet consumer demands and enhance our environment.

#### What has been done

Efforts were made to evaluate and maintain the interspecific Ilex collection held at Rutgers without increasing its size or scope. Significant expansions were made in the breeding and selection of large-bracted dogwoods, focusing on the development of advanced generation hybrids of *Cornus kousa*, *C. florida*, and *C. nuttallii* expressing excellent plant health and vigor, improved leaf characteristics and color, resistance to the disease powdery mildew, and dark-pink floral bracts. Ten select hybrid seedlings were propagated by grafting and cuttings for further evaluation in field plantings. The development of eastern filbert blight (EFB)-resistant ornamental hazelnuts was also continued with new populations of seedlings segregating for ornamental traits and disease resistance in field and greenhouse trials at Rutgers. Five of our best green-leaf, EFB-resistant, contorted hazelnut selections have been propagated and established in several locations in central NJ for additional testing prior to being considered for patenting and release. Efforts were begun to assess the large *Cornus* germplasm collection with microsatellite (SSR) markers to help characterize the collection, assess genetic diversity, and track specific lineages of interest. The use of tissue culture is being explored as a means to efficiently ramp up production of new breeding selections of *Cornus* and *Corylus* in the development pipeline for larger-scale testing and subsequent release. Presentations on the Rutgers woody ornamental breeding program were made at the 2nd International Symposium on Woody Ornamentals of the Temperate Zone, in Gent, Belgium, and the South Jersey Nursery Meeting held at the Rutgers Cooperative Extension of Cumberland County Extension Education Center, Millville, NJ.

#### Results

New disease-resistant cultivars in the development pipeline at Rutgers will have a positive impact on the U.S. nursery industry and on property values and quality of life where they are grown. Their resistance to their primary insect and disease pests will reduce the need for harsh pesticide sprays and will add to plant longevity in the landscape. The program to develop ornamental hazelnuts (*Corylus* spp.) is showing considerable progress. Since very few eastern filbert blight resistant hazelnuts are available, incorporating disease resistance into the ornamental germplasm

will provide for the development of novel cultivars, leading to an increase in the diversity of plant species options (including native species) available for use in the landscape. Many of these also produce edible nuts which may allow them to double as components of edible ornamental landscapes.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
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

Ag Viability was impacted by natural disasters, hurricanes Irene and Sandy, drought and flooding.

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

##### Evaluation Results

See Qualitative Outcomes

##### Key Items of Evaluation

See Qualitative Outcomes

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

**Program # 5**

**1. Name of the Planned Program**

Sustainability of NJ Equine Industry and Its Impact on Agriculture and Open Space

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
301	Reproductive Performance of Animals	20%		20%	
302	Nutrient Utilization in Animals	20%		20%	
303	Genetic Improvement of Animals	20%		20%	
312	External Parasites and Pests of Animals	20%		20%	
315	Animal Welfare/Well-Being and Protection	20%		20%	
	<b>Total</b>	100%		100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	6.0	0.0	3.0	0.0
Actual Paid Professional	7.5	0.0	1.2	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
110391	0	55818	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
732341	0	284377	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
46151	0	79311	0

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

**1. Brief description of the Activity**

- Share the results of the 2007 Economic Impact Study
- Horse Management seminars and Equine Science Update (county and statewide)
- Public relations and promotions
- Actively engaged as outside speakers for the industry State 4-H horse program
- Perform consultations to individuals and agricultural organizations
- Maintain research-based website
- Conduct research to impact policy decisions for industry
- Conduct roundtables
- Produce research based materials
- Hold annual stakeholder meeting to Identify issues of importance
- RUBEA-advisory committee
- Facilitate the opportunity to network within the industry

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

Equine users - including, students/youth, equestrians, owners

Equine professionals: veterinarians, researchers, industry leaders, farmers, service providers, trainers, breeders, stable managers

Legislators/Government Officials/Industry Officials e.g. Racing Commission, Sport and Competition Officials (FEI, USEF)

Educators

General public

**3. How was eXtension used?**

Extension Specialists participate in the Horse Quest CoP. Answered ask an expert questions and developed collaborative educational products.

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

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	385	12954	0	5551

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

**Patent Applications Submitted**

Year: 2012

Actual: 1

**Patents listed**

61-592,332

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

**Number of Peer Reviewed Publications**

<b>2012</b>	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Actual</b>	6	13	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, and publications. In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected.

<b>Year</b>	<b>Actual</b>
2012	0



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

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

O. No.	OUTCOME NAME
1	Short Term - New Jersey residents and government officials will be made aware of the importance of the equine industry. Equine enthusiasts take leadership roles to unify the industry and will acquire knowledge to support the industry's sustainability. Equine industry segments will learn the importance and benefits of speaking in one voice.
2	Medium Term - Diverse equine-related units are organized into one voice. Misperceptions by the general public re: the segments of equine industry are corrected. All uses of the horse are recognized as agricultural by local and state government officials.
3	Long Term - Equine industry is unified and is economically sustainable. Equine industry is recognized as a critical component of the economic development, of traditional agriculture, and the preservation of open space.
4	Physiological Response to Exercises Following Various Management and Pharmacological Manipulations in Horses: Medium Term - Diverse equine-related units are organized into one voice. Misperceptions by the general public re: the segments of equine industry are corrected. All uses of the horse are recognized as agricultural by local and state government officials.

**Outcome #1**

**1. Outcome Measures**

Short Term - New Jersey residents and government officials will be made aware of the importance of the equine industry. Equine enthusiasts take leadership roles to unify the industry and will acquire knowledge to support the industry's sustainability. Equine industry segments will learn the importance and benefits of speaking in one voice.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	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**

<b>KA Code</b>	<b>Knowledge Area</b>
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
312	External Parasites and Pests of Animals
315	Animal Welfare/Well-Being and Protection

## **Outcome #2**

### **1. Outcome Measures**

Medium Term - Diverse equine-related units are organized into one voice. Misperceptions by the general public re: the segments of equine industry are corrected. All uses of the horse are recognized as agricultural by local and state government officials.

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

- 1862 Extension
- 1862 Research

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

Change in Action Outcome Measure

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

<b>Year</b>	<b>Actual</b>
2012	0

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

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

Metabonomic Detection of Abnormalities in Horses: A Search for Early Diagnosis and Dietary Intervention and Potential Models for Human Disorders

Horse and human share similar physiology more so than other animals considered for research, which is why the horse is an excellent model for human medicine. Unlike other animals, horses and humans have comparable thermoregulation ? they sweat in order to control body temperature. Another similarity is the autonomic control of cardiac function, which is a mix of the parasympathetic and sympathetic systems. Horses also age like humans. As horses and humans get older, they share many of the same problems such as arthritis and diabetes.

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

The results of NJAES metabonomic/metabolomic studies on osteochondrosis dissecans in horses that were completed in fall, 2011 were presented as a plenary talk for the American College of Veterinary Nutrition at the American College of Veterinary Internal Medicine Forum in New Orleans on May, 2012. The researcher was also part of a panel discussion of the importance of forages to equine metabolism and well being at the European Workshop on Equine Nutrition pre-conference workshop in Lisbon, Portugal June, 2012.

#### **Results**

NJAES research studies have pioneered the use of metabonomics/metabolomics in horses. The data analyses have revealed that there are distinct and repeatable differences in the metabolic profiles of young horses that develop osteochondrotic lesions versus those that do not, which is of great significance to both equine and human health, since OCD lesions also affect young humans. Previously thought to be primarily a glucose/insulin metabolic defect, we now know that

in individuals that develop osteochondrotic lesions, there are alterations in both lipoprotein and amino acid pathways that are potentially able to be corrected with dietary supplementation. The work has stimulated further collaborative research in New South Wales, Australia, partnering with colleagues at the University of New South Wales in Sydney, financed by Peter'S Easy Feeds, Inc. A patent application is being filled based on the results of the studies so dissemination of results is somewhat limited.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
312	External Parasites and Pests of Animals
315	Animal Welfare/Well-Being and Protection

#### Outcome #3

##### 1. Outcome Measures

Long Term - Equine industry is unified and is economically sustainable. Equine industry is recognized as a critical component of the economic development, of traditional agriculture, and the preservation of open space.

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

##### 3a. Outcome Type:

Change in Condition Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2012	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
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
312	External Parasites and Pests of Animals
315	Animal Welfare/Well-Being and Protection

#### Outcome #4

##### 1. Outcome Measures

Physiological Response to Exercises Following Various Management and Pharmacological Manipulations in Horses: Medium Term - Diverse equine-related units are organized into one voice. Misperceptions by the general public re: the segments of equine industry are corrected. All uses of the horse are recognized as agricultural by local and state government officials.

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2012	0

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

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

Physiological Response to Exercises Following Various Management and Pharmacological Manipulations in Horses

Horse and human share similar physiology more so than other animals considered for research. As they get older they share the same problems such as arthritis and diabetes. This makes them perfect subjects for research related to human health.

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

Continued research and resulting publications focused on the effects of aging and training on the hypothalamic pituitary adrenal axis and the interactions with the neuroendocrine and cytokine

control of energy homeostasis. An NJAES researcher conducted contract work testing a device to measure osmolality of aqueous humor. This work was funded by the Department of Defense (DOD) and their contractor Chromologic, Inc.

### **Results**

The findings of the studies of the aged horse have increased our knowledge of how aging alters the integration of the endocrine and other physiological systems in the control of energy balance. The information has application to human as well as equine medicine as both species suffer from obesity and the related metabolic disorders. Current NJAES research in the lab is building upon that research to determine which signaling proteins are responsible for the observed changes. Potential future impacts may be novel ways to treat obesity, insulin resistance, and diabetes. The information generated in the DOD sponsored project will lead to the development of an instrument that will allow clinicians and scientists to use the non-invasive measurement of aqueous humor osmolality to assess hydration status. This will advance the care of humans and animals by allowing for more rapid treatment of potential life threatening dehydration.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
312	External Parasites and Pests of Animals
315	Animal Welfare/Well-Being and Protection

## **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**

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

### **Evaluation Results**

See Qualitative Outcomes

### **Key Items of Evaluation**

See Qualitative Outcomes

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

**Program # 6**

**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%	
	<b>Total</b>	100%		100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	3.2	0.0
Actual Paid Professional	19.6	0.0	11.6	0.0
Actual Volunteer	2418.0	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
499395	0	541153	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1386617	0	3713666	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
288828	0	2581709	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-health 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 and 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?**

Livestock Poultry Environmental Learning Center  
Animal Manure Management  
Bee Health

Faculty answered ask an expert questions.

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

### **1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	396	492	0	0

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

Year: 2012  
 Actual: 17

**Patents listed**  
 61-679,810

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

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
Actual	12	97	109

**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
2012	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	4-H Environmental Ambassador Program - Waste Management and Environmental Conservation: 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.
5	Involving Youth in the Improvement of their School Grounds: 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.
6	Involving Youth with Improving the Environment in Union County through the 4-H Master Tree Steward Program: 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.
7	Earth-wise Lawn and Landscape Care Educational Program: 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.
8	Sustainable Residential Landscapes in Salem and Cumberland Counties: 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.
9	Green Infrastructure for Municipal Officials: 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.
10	Forest Stewardship: 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.

**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.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	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**

<b>KA Code</b>	<b>Knowledge Area</b>
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 #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
2012	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Animal Waste Management Law Education

As of March of 2009, the state of New Jersey passed a law that requires all livestock farms, regardless of number of animals, as well as those who handle manure, to proactively address and manage non-point source pollution that may originate from livestock operations.

#### What has been done

In 2012, Animal Waste Management Workshops were conducted by Rutgers Cooperative Extension of Salem County employees where producers were guided through the process of creating their Animal Waste Management Plan (AWMP). By the end of the session, the producers were able to complete a declaration page and file their AWMP so that they were in compliance with the state rule.

#### Results

As of year-end 2012, there are approximately 1,000 declaration pages collected by the New Jersey Department of Agriculture (NJDA), meaning there are 1,000 animal waste management plans in effect.

### 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
2012	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
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**

4-H Environmental Ambassador Program - Waste Management and Environmental Conservation: 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
2012	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

4-H Environmental Ambassador Program - Waste Management and Environmental Conservation

Society is faced with issues related to the disposal and management of solid waste. It is vital to address these issues and concerns effectively and efficiently while maintaining a balance among the environment, human health and economic benefits. There are no in-depth environmental and waste management programs for youth in 5th-7th grades. Today's young people, as the future leaders and inhabitants of our earth, must be empowered to take action to address these issues and create needed changes.

#### What has been done

The 4-H Environmental Ambassador Program is a 3 day/2 night educational opportunity for youth in grades 5-7 from a three county region in the southern part of New Jersey to study waste management and environmental conservation. Participants become environmental ambassadors in their schools and communities and are responsible for organizing and implementing environmental projects.

The program brings waste management alternatives and environmental issues to life through a variety of activities that utilize experiential, inquiry-based and cooperative learning techniques. Participants learn about alternatives such as recycling, landfilling, incineration, source reduction and composting. The program also emphasizes careers in the field of waste management and how everyone can have an impact on the environment by handling trash effectively.

#### Results

This annual program, which in 2012 completed the 14th year, was recently recognized with the 2012 National Association of Extension Agents Natural Resources and Environmental Education Award.

Evaluation data for 2012 revealed the following results: 100% of the youth and adults increased their scores from the pre-test to post-test by an average of 39%, 85% of the program participants self-reported an increase in knowledge of waste management alternatives, and 98% of the participants indicated that they would recommend this program to other students in their school.



**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

Involving Youth in the Improvement of their School Grounds: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Involving Youth in the Improvement of their School Grounds

School grounds in Union County need more trees ? to make shade (protects against skin cancer), to help fight asthma (filter particulate matter out of the air), and to add beauty to the lives of county residents. Involving children in these efforts provides them with valuable leadership and stewardship skills.

**What has been done**

In 2012, 4-H trained 70 students from 35 different schools on how to plant and care for trees. These 70 students then proceeded to plant \$2,000 worth of shade trees on their school property. In the process of planting and caring for the trees, they involved an additional 1,000 students.

**Results**

\$2,000 worth of trees were planted. Publicity for the importance of planting trees was generated in several Union County communities enhancing youth stewardship skills and having a sustainable impact on the environment.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

Involving Youth with Improving the Environment in Union County through the 4-H Master Tree Steward Program: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

### Involving Youth with Improving the Environment in Union County through the 4-H Master Tree Steward Program

According to surveys, Union County needs more trees ? to make shade in order to protect against skin cancer, to help fight asthma (trees filter particulate matter out of the air), and to add beauty to the lives of county residents. Involving children in all these efforts provides them with valuable leadership skills.

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

The 4-H Master Tree Steward Program is a volunteer program. 4-H trains adults in tree biology and care. Once trained, the volunteers use a specially designed curriculum with hands-on activities to teach school-aged children about trees.

#### **Results**

A sampling of 226 students showed that as a result of the Rutgers/4-H Class on Tree Appreciation: 71% said they were less likely to damage trees, 90% said they were more likely to take better care of trees around their homes, 86% said they were more likely to take better care of trees around their schools, 70% said they will observe trees more closely, 69% said they are more likely to plant a tree, 98% said they learned that there are many different kinds of trees, 84% said they were more likely to stop others from damaging trees, 78% said they want to learn more about tree care and planting, 83% said they will tell someone about what they learned.

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

<b>KA Code</b>	<b>Knowledge Area</b>
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 #7**

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

Earth-wise Lawn and Landscape Care Educational Program: 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
2012	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Earth-wise Lawn and Landscape Care Educational Program

Over the past 10 years, surveys conducted during Master Gardener training in Middlesex and other counties throughout New Jersey to over 300 students, indicate that 95% of participants would like to reduce or eliminate pesticide use, fertilizer, water use and other unnecessary inputs to their landscapes.

#### What has been done

"Earth-wise Lawn and Landscape Care", the three hour comprehensive class 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 was presented by the agricultural agent.

The presentation references current research on the selection, care and maintenance of landscape plant 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.

#### Results

A total of 253 students received training in 10 classes throughout the state in 2012. Surveys indicate a total of 60 acres of lawns and landscapes were managed by students in the program. (Individual lawn size averaged between  $\frac{1}{4}$  and  $\frac{1}{5}$  of an acre) projections were based on students completing the surveys.

80% of total students committed to recycling grass clippings back to 60 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 2,090 pounds of Nitrogen total.

Based on the energy needed to produce Nitrogen fertilizer per pounds, this results in a savings of 70 million BTU's of energy or a reduction of equivalent #2 fuel oil diesel equivalent of 501 gallons.

Reduce over 18 million gallons of unnecessary water use for July and August alone.  
78% 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 47 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 2,350,000 gallons per irrigation or 18,800,000 gallons for 8 applications during July and August.

Reduction of 31,363 pounds of grass clippings or 15.68 tons 80% of participants committed to recycling grass clippings on 48 acres of the total 60 acres. Based on an average of 75 lbs of grass clippings generated by an average 5,000 square feet lawn, participants will reduce 31,363 pounds of grass clippings or 15.68 tons. This could result in a savings in landfill tipping fees of over \$2,000 and solid waste management.

#### 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 #8

##### 1. Outcome Measures

Sustainable Residential Landscapes in Salem and Cumberland Counties: 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
2012	0

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

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

#### **Sustainable Residential Landscapes in Salem and Cumberland Counties**

The landscapes of Salem and Cumberland Counties include a mix of agricultural, urban, and suburban land uses. There are 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 stakeholder groups not traditionally possessing a high degree of expertise in land management such as homeowners and municipalities. In a larger sense, 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**

The education program designed to address these needs was multifaceted. Four short workshops were held covering the topics of environmentally-friendly lawn care, soil quality and runoff, pond maintenance for a healthy environment, and outdoor water conservation in residential landscapes. In addition, four additional formal presentations were made to a newly formed watershed association in the state-designated priority watershed in Cumberland County. Along with these, a scripted slideset was composed to educate about fecal contamination in waterbodies, and made available to stakeholders online. Also, a 30-page Extension bulletin on outdoor water conservation was composed and made available to the public online and through Extension county offices. Additional outreach efforts included newspaper articles, newsletter articles, blog posts, and poster displays at local county fairs.

### **Results**

This programming successfully resulted in knowledge gain and the expectation of behavior change among program participants. Program evaluations from the 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 2.9 out of 5.0 to 4.2 out of 5.0. Likewise, self-reported knowledge in the pond maintenance class increasing from an overall average of 2.6 to 4.8. Changes in behaviors are expected to result from these programs as well. For example, in the soil quality in runoff class, 92% of participants said they would test their soil and improve their soils for environmental quality, and 62% said they would use what they learned to educate others. The work with the local watershed association is expected to have lasting results on the environment.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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 #9**

**1. Outcome Measures**

Green Infrastructure for Municipal Officials: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Green Infrastructure for Municipal Officials

Much of Essex and Passaic Counties are highly urbanized with numerous stormwater and combined sewer issues. A combined sewer system is one in which there is one pipe that handles both wastewater and stormwater. During dry weather, the sewage flows to the wastewater treatment plant with no issues, but 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**

Two seminars called ?Stormwater Management Techniques for Runoff Reduction? 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.

Permeable pavement is a stormwater management system with a surface that allows water to pass through into an underlying storage layer. This stormwater best management practice provides both water quantity control and water quality improvement, while serving a practical

purpose with a surface that is able to be driven, parked, or walked upon. This initiative was undertaken due to the major flooding and stormwater impacts with which the two counties often grapple and efforts were increased in the aftermath of Hurricane Irene in 2011.

The seven rain gardens in four Passaic County municipalities are capturing and treating more than 114,000 gallons of runoff per year, and capturing suspended soils, phosphorus and nitrogen that can have negative impacts on water quality and natural ecosystems.

### **Results**

The City of Newark has committed to a new 700 ft<sup>2</sup> permeable pavement sidewalk installation (Goodwin Ave.) and the project is currently out to bid. 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 ft<sup>2</sup> 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**

<b>KA Code</b>	<b>Knowledge Area</b>
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 #10**

### **1. Outcome Measures**

Forest Stewardship: 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
2012	0

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

**Issue (Who cares and Why)**

Forest Stewardship

Almost one hundred and twenty thousand landowners own approximately 1.3 million acres of forestland in New Jersey, yet less than 12 percent of those owners actively manage their forestlands. Because of increasing developmental pressures and the increasing value of the state’s forests for open space, water, wildlife, and quality of life as well as traditional forest products, it is more important than ever that these private lands are actively and sustainably managed.

**What has been done**

The Extension Specialist conducted 6 presentations and evening programs, and two field days on forest stewardship for private, nonindustrial forest landowners. The third New Jersey Woodlands Stewards Program was conducted, a three-day program that graduated the third class of trained volunteers. Assistance was also provided for planning and conducting the annual Tree Farm Day.

One twilight meeting was conducted for Christmas tree growers. Two presentations on shearing, accompanied by a demonstration, were presented at the twilight meeting and at the NJ Christmas Tree Growers Association’s annual summer meeting. Four online newsletters were published for woodland stewards and one newsletter for Forest Stewardship woodland owners was published.

**Results**

With the average size of forestland ownership in New Jersey of 15 to 20 acres, some 5,535 to 7,380 acres have benefited from more knowledgeable landowners, subsequent better management, and a higher likelihood of remaining forested. The potential impact of the 10 volunteers of the third graduating class of the New Jersey Woodland Stewards Program is significant: each volunteer is expected to spend 30 hours over the coming year promoting forestry in New Jersey. At the federal volunteer rate of \$20.85/hour for volunteer time, their efforts will be valued at over \$6,255.

**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**

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

**Evaluation Results**

See Qualitative Outcomes

**Key Items of Evaluation**

See Qualitative Outcomes

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

**Program # 7**

**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%	
	<b>Total</b>	100%		100%	

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

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

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	25.0	0.0	13.0	0.0
Actual Paid Professional	18.1	0.0	0.9	0.0
Actual Volunteer	94.0	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
248727	0	73466	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1505585	0	284849	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
110688	0	180832	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?**

Invasive Species CoP was used by faculty.

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

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2757	25	0	0

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

**Patent Applications Submitted**

Year: 2012

Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
Actual	6	5	11

**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
2012	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	Development of Fruit Entomology Program Aimed at Developing Reduced-Risk Strategies for Integrated Pest Management (IPM), With a Focus on Insect Ecology and Behavior: 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.
5	Turfgrass Entomology Program: 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.
6	Development of Best Management Practices for Suppression of Anthracnose Disease on Annual Bluegrass Turf: 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.
7	North Jersey Ornamental Horticulture Conference Turf Day Program: 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

	<p>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.</p>
8	<p>Enabling Pesticide Registrations for Specialty Crops and Minor Uses: 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.</p>
9	<p>Nursery Integrated Pest Management: 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.</p>
10	<p>Pesticide Safety: 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.</p>
11	<p>Upland Fruit (Tree Fruit and Grape) Integrated Pest Management (IPM) Delivery: 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.</p>
12	<p>Blueberry and Cranberry Insect Pest Management ? Towards the Development and Implementation of Reduced-Risk Strategies: 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.</p>
13	<p>Developing and Implementing Integrated Pest Management Strategies : 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.</p>

14	<p>Weed Control in Vegetables, Tree Fruit, Small Fruit, and Cranberries: 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.</p>
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**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.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2012	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**  
216            Integrated Pest Management Systems

**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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Developing Integrated Urban Pest Management Strategies

Environmental issues are among the most serious problems faced statewide and nationally. 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**

The Extension Specialist in Urban Entomology conducted a variety of research activities in two housing complexes in Newark, New Jersey; one housing authority in Jersey city, New Jersey; and a housing complex in Indianapolis, Indiana. This included: 1) field testing of new bed bug lures and trap designs developed by our research team; 2) survey of bed bug infestations in low-income housing communities; 3) implemented an integrated bed bug management program; and 4) evaluation of resident behavioral change after education. Events. Research findings were delivered at the following conferences: Bed bug summit organized by Singapore Pest Management Association; XXIV International Congress of Entomology, Daegu, South Korea; National Conference on Urban Entomology, Atlanta, GA; Eastern Branch of the ESA meeting, Hartford, CT; Entomological Society of America annual meeting. Reno, NV. Demonstrated integrated bed bug management program in two housing complexes. Provided face to face

trainings to housing staff, health officers, and pest control technicians in New Jersey. Presented a webinar to health care and social workers in the U.S. A 7 minute video on bed bugs; 5 short video clips; two powerpoint presentations for training residents and staff; five brochures on bed bugs; a bed bug web site (<http://njaes.rutgers.edu/bedbug/info>).

### **Results**

Change in knowledge; residents, housing staff, social workers, and health officers are more aware of the biology of bed bugs and how to prevent them and control them using safe, effective methods. Pest control technicians are more aware of the newest pest control technologies and their effectiveness. Change in actions; after our education on proper bed bug prevention and control methods, residents report that they rarely use over-the-counter sprays or foggers for bed bug control. Increased number of housing staff are using monitors to monitor bed bug infestations and using non-chemical methods to control bed bugs. These methods include using a steam machine to treat infested furniture and installing mattress encasement. Many social workers, law enforcement officers, health workers now follow our advice on bed bug prevention when doing their work. Change in conditions; we demonstrated two bed bug management programs in a low income housing complex in Newark, New Jersey. Eight apartments were included in each treatment program. After 12 weeks, the number of bed bugs were reduced by 92 and 95 percent respectively. We also implemented a building-wide bed bug management program in Indianapolis, Indiana. After 1 year, the infestation rate was reduced by 27 percent. The number of apartments with more than 10 bed bugs was reduced by 83 percent. Surveys of 89 residents show 90 percent of the residents rated the program good or very good, while 10 percent of residents rated the program as fair.

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

<b>KA Code</b>	<b>Knowledge Area</b>
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
2012	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
216	Integrated Pest Management Systems

**Outcome #4**

**1. Outcome Measures**

Development of Fruit Entomology Program Aimed at Developing Reduced-Risk Strategies for Integrated Pest Management (IPM), With a Focus on Insect Ecology and Behavior: 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
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2012

0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Development of Fruit Entomology Program Aimed at Developing Reduced-Risk Strategies for Integrated Pest Management (IPM), With a Focus on Insect Ecology and Behavior

Endemic pests and invasive insects threaten the livelihood of NJ's long-standing fruit production. There is an immediate need to develop curative management strategies to protect peach, wine grapes and cranberries from this suite of dynamic pest species so that NJ growers can continue to provide locally produced fresh-market produce.

#### What has been done

Extension practices have been focused on on-farm visits to understand grower operations and needs and to make the necessary connections with growers and extension collaborators. The research and extension program is targeted to generate science-based research results that growers can readily apply to their farm or orchard to make production practices more economically and environmentally sustainable. Focused work has developed a phenological model and a reduced spray program for management of Brown Marmorated Stink Bug (BMSB) that has been the topic of numerous extension talks and has been integrated into the Rutgers Tree Fruit Production Guide 2013. We had three cooperating growers who participated in the on-farm reduced spray program, all of whom were quite happy with the results and have agreed to participate again in 2013.

#### Results

The immediate result of the NJAES research program have been a decrease in the amount of insecticide active ingredient applied to tree fruit. This increases economic outputs for the grower, increases worker safety and reduces the amount of materials put into the environment.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

### Outcome #5

#### 1. Outcome Measures

Turfgrass Entomology Program: 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
2012	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Turfgrass Entomology Program

In the USA (in New Jersey), turfgrass in its many forms, e.g. lawns, parks, cemeteries, sod farms, golf courses, athletic fields, covers > 30 million (0.9 million) acres and is a \$45 billion (\$0.8 billion) industry. The most wide-spread, destructive, and difficult to control turfgrass insect pest in New Jersey and the Northeastern USA are several species in the white grub complex. In fine turf, the annual bluegrass weevil is a pest of increasing importance and difficulty to control in New Jersey and the Northeastern USA. The black cutworm is perennial and cosmopolitan pest of on golf courses. Due to the implementation of the Food Quality Protection Act of 1996 and local legislation, fewer and fewer insecticides are available for the control of these pest. Preventive applications of insecticides have become the standard for these pests but are expensive, of limited compatibility with IPM, and do not work well against some white grub species and often require several applications per year for the annual bluegrass weevil. The number of annual bluegrass weevil populations with resistance to insecticides continues to be on the rise. There is a dire need for the development of alternative control agents and control strategies.

#### What has been done

The target Extension audiences are turfgrass professionals (golf, athletic fields, landscapers, sod growers, etc.), County Ag Agents, and homeowners (mostly through County Ag Agents and master gardeners). Activities include: 1) teaching (Cooperative Extension Talks, local and regional turf conferences, Continuing Education courses, Field day), 2) turf insect management recommendations (publications and by email/phone/personal), 3) publications (trade journal and newsletter articles, fact sheets, bulletins).

NJAES research developed and implemented ecologically-based IPM for turfgrass systems with emphasis on sustainability and non-chemical control approaches.

#### Results

Research and Extension efforts will help turfgrass managers and homeowners in New Jersey and the Northeast to manage turfgrass insect pests more effectively with reduced risk to health and environment. The financial impact cannot be estimated at this time, as it will depend on the cost and persistence of the developed control agents/strategies. However, in most turfgrass situations health and environmental concerns tend to outweigh financial concerns.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

#### Outcome #6

##### 1. Outcome Measures

Development of Best Management Practices for Suppression of Anthracnose Disease on Annual Bluegrass Turf: 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
2012	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

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. A recent report by the World Golf Foundation stated that golf contributes \$62.2 billion worth of goods and services each year to the national economy ([www.golf2020.com](http://www.golf2020.com)).

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

Due to the increasing severity of anthracnose on golf courses in North America, studies were initiated at nine universities (CA, CT, MD, MI, NC, NJ, NY, PA and ON [Guelph, Canada]), including Rutgers as part of a multistate turf regional research project (NE-1025; now NE-1048). The goal of 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. The objectives of this project were specifically to 1) Fill critical knowledge gaps in our understanding of the biology, ecology, and impact of anthracnose associated with annual bluegrass on golf courses in the Northeast and Mid-Atlantic US; 2) Identify and develop new cultural, biological, chemical, and genetic control options for suppressing anthracnose on golf courses; 3) Develop improved IPM decision tools for managing anthracnose; and 4) Develop BMPs that will help reduce the economic and environmental costs associated with fungicides currently used to control this disease.

Findings were disseminated to stakeholders via state, regional, national and international conferences, newsletters, trade and professional publications, blogs, podcasts, and webcasts. Information to the general public was disseminated through publications in the popular press, magazines, oral and written presentations at workshops and at golf course research field days. A feature article on the biology and control of anthracnose was published in Golf Course Management (GCM) Magazine (an international trade journal with a readership of 23,000 turf managers) in 2008 to widely disseminate research results from the first 3-years of this project. Four follow-up articles were published in the May/June 2012 issues of GCM to document further project accomplishments and to update our BMPs for superintendents in the US and abroad. A list of all publications developed by NE-1025 members have been updated each year and posted on the NE-1025 and the NE-1048/NIMSS ([www.lgu.umd.edu](http://www.lgu.umd.edu)) website.

### Results

Based on a validation of the research conducted for this project in 2012, different combinations of BMP cultural management factors resulted in the following reductions in fungicide usage (i.e., few fungicide applications during the summer 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) and non-BMP mowing (0.09 in) regime was used; and an 80% reduction with a combination of BMP N and BMP mowing heights.

## 4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

## Outcome #7

### 1. Outcome Measures

North Jersey Ornamental Horticulture Conference Turf Day Program: 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
2012	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

North Jersey Ornamental Horticulture Conference Turf Day Program

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. A recent report by the World Golf Foundation stated that golf contributes \$62.2 billion worth of goods and services each year to the national economy ([www.golf2020.com](http://www.golf2020.com)).

#### What has been done

The North Jersey Ornamental Horticulture Conference (NJOHC) has been serving the turf industry for 51 years. The main objective of the NJOHC Turf Day program is to promote the adoption of integrated pest management practices by industry professionals. Adoption of IPM practices will reduce the amount of fertilizers and pesticides used on residential, commercial and public properties.

#### Results

On the program evaluation, 99% of the participants learned something they intend to apply to their turf management practices. Ninety-four percent of the professionals will make more informed pest management decisions.

Of the participants who indicated they had attended programs in the past, 86% have changed their pest control practices as a result of the program. Changes were described as practicing IPM, using less chemicals, using organic chemicals, and better record keeping. One participant noted "applied field test results to my actual treatments-not trial and error."

Fifty-one percent of the professionals reported they use less pesticide. Evaluations showed that 27 professionals reduced use by 1-10%, 24 by 11-20% and 6 by 21 -30%. As a result of the training, 41% of the participants indicated their business saved money. The amounts ranged



from \$2,000 to \$8,000 dollars.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

#### Outcome #8

##### 1. Outcome Measures

Enabling Pesticide Registrations for Specialty Crops and Minor Uses: 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
2012	0

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

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

Enabling Pesticide Registrations for Specialty Crops and Minor Uses

Agricultural chemical producers readily test and seek U.S. Environmental Protection Agency (EPA) approval for new pesticides for blockbuster crops like corn and wheat. That's because there's a potential to market a product that can be used on from 70 to 80 million acres. The chemicals industry recoups its investment and makes a profit.

Other, smaller crops like mint and cucumbers are generally not worth the industry's attention. But these minor crops?defined as those grown on 300,000 acres or less?are helped by a federal-state project known as Interregional Research Project No. 4, or IR-4.

According to the most recent census of agriculture, 11 million acres of minor crops are grown annually in the United States," says Guest. "They have a combined value of \$32 billion and

represent 42 percent of all crop sales. In 27 states, these minor crops exceed the value of all the other major crops including corn, cotton, soybeans, and wheat."

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

The IR-4 Project continues to develop necessary data to support the registration of pest control products for specialty crops and other markets where industry sector lacks the incentive to register the important uses. Food Program: based on IR-4 submissions, EPA approved 188 new pesticide tolerances supporting 766 new uses. EPA also codified updates to the stone fruit and tree nut crop groups. To support future registrations on food crops, IR-4 initiated 75 new residue studies that consisted of 532 field trials. IR-4 also conducted over 85 efficacy and/or crop safety trials on food crops to answer the product performance data requirements for 29 projects. IR-4 submitted new residue tolerance petitions on 37 different chemicals to EPA that cover over 160 IR-4 requests from stakeholders and should provide hundreds of new crop registrations for growers.

Ornamental registrations and label amendments for ornamental horticulture crops partially based on IR-4 data, which specifically impacted 2,485 ornamental uses. During this period IR-4 implemented activities for future registrations including: initiating 740 field and greenhouse trials on ornamental crops to collect efficacy and/or crop safety data within 481 studies; writing and submitting to registrants 22 data summaries to registrants to expand the use of pesticides on ornamentals; and collaborating with national and international scientists on the development of efficacy data for invasive species. Public Health Program: IR-4 submitted additional data to support IR-4's 1st public health pesticide residue study to support registration of etofenprox to control adult mosquitoes near crops. Also expanded online database and published Public Health Pesticides Inventory, with information on specifications, regulatory, use, efficacy, and safety information on 600+ materials.

#### **Results**

The IR-4 Project leverages resources to pursue registration for such uses. When well-established methods of measuring direct and secondary economic impacts are used to gauge the contributions of the IR-4 Project and its three primary programs, including the Food Crops, Ornamental, and Biological and Organic Support programs in terms of sales, employment and gross domestic product is significant. Each program posts real economic benefits to growers and the economy as a whole. Specifically, growers benefit in higher yields with higher quality output, consumers benefit by higher varieties and lower costs to food and ornamental crops, and the industry benefits through better global competitiveness of U.S. output. Including all secondary impacts, the IR-4 Project is anticipated to support research and industry sales sufficient to support 104,650 U.S. jobs and bumps annual gross domestic product by \$7.3 billion.

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

<b>KA Code</b>	<b>Knowledge Area</b>
216	Integrated Pest Management Systems

## **Outcome #9**

### **1. Outcome Measures**

Nursery Integrated Pest Management: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

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

Nursery Integrated Pest Management

According to the USDA 2007 Agricultural Census, there are 183 nurseries located in Cumberland & Salem Counties. Cumberland County's 135 nurseries alone accounts for the largest concentration of nurseries for any county in New Jersey and the fifth largest in the United States. Within Cumberland County there are over 7,500 acres of stock in the open and more than an additional 115 acres listed as being under protection. The nursery with the most diverse plant inventory produces over 2,000 varieties of plants. Pesticide development has evolved from products that control a wide range of pests to ones that are very focused on certain pests or pest classes. This has resulted in more specificity along with higher pesticide costs.

The combination of many plant varieties, the various pests, and the issue of increasingly pest-specific pesticides creates a serious challenge to growers in their efforts to control pests. In addition, growers need to rotate between classes of pesticides to help reduce the possibility of pest resistance. The final issue is grower concern of phytotoxicity.

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

Integrated pest management relies on scouting plant material to determine pest presence and pressure. Using scouting information, Cooperative Extension personnel offer control strategies.

The Cooperative Extension Program Associate, scouted a total of 182 acres of nursery plant

material during the 2012 growing season.

**Results**

A goal of the IPM program and a measure of success is to have nurseries train their personnel and start their own integrated pest management programs. Two nurseries continued to take advantage of personnel training during 2012. One nursery that was involved with the scouting program during 2010 and 2011 initiated their own program for 2012. It was the fourth nursery to take on their own scouting program, with nurseries initiating their own programs in 2009, 2010 and 2012. Work continues with growers from three additional nurseries to train personnel in scouting techniques.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
216	Integrated Pest Management Systems

**Outcome #10**

**1. Outcome Measures**

Pesticide Safety: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Pesticide Safety

Pesticides are designed to (in most cases) kill pests. Many pesticides can also pose risks to people. However, in many cases the amount of pesticide people are likely to be exposed to is too

small to pose a risk. To determine risk, one must consider both the toxicity or hazard of the pesticide and the likelihood of exposure. A low level of exposure to a very toxic pesticide may be no more dangerous than a high level of exposure to a relatively low toxicity pesticide.

**What has been done**

The annual Salem County pesticide safety meeting, entitled "2012 Salem County Pesticide Safety Meeting," was held. Farmers of various commodities attended this workshop to learn about current and emerging insecticides, pesticide control and monitoring in groundwater, weed resistance and herbicides for vegetable crops, worker protection standards and pesticide regulations, weed control for grain crops, and pesticide infiltration into water sources.

**Results**

Seventy-four farmers received pesticide handling safety equipment: 100% of farmers surveyed 6 months after the meeting has utilized safety equipment, 5 producers changed record-keeping policies to coincide with NJDEP regulations, 8 producers made appropriate changes to reduce herbicide resistance in weeds on their operation, 2 producers began posting re-entry interval signs to comply with worker protection standards, 3 producers plan to utilize drip irrigation to make more efficient use of pesticides, 6 producers plan to utilize filter strips and/or swales to reduce pesticide runoff. Overall, 47% of participants made changes to their operations as a result of this meeting.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
216	Integrated Pest Management Systems

**Outcome #11**

**1. Outcome Measures**

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

2012

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. Statewide in 2012, tree fruit was valued at over \$16 million for apples and just over \$32 million for peaches. 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. \$10-12 million.

#### What has been done

An integrated crop management (ICM) program was delivered to commercial fruit growers who produced apples, peaches, nectarines, and grapes. The program reached both primary and secondary participants. Secondary participants attended Extension update meetings, and received 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.

A broadcast fax service was used in Hunterdon and Gloucester Counties to advise of timely pest events and supplement the Plant and Pest Advisory Fruit Edition Newsletter. Organized grower meeting contact reached a total of 537 audience members, while on-farm consultations totaled 1,986 visits. 29 weekly articles were written in a statewide newsletter, with a total circulation of 178 subscribers in NJ and 9 other states. Acreage impacted by primary participants totaled 75% 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

Weekly pest management recommendations to growers led to pest free fruit valued at \$48 million throughout the state for tree fruit and \$39 million for grapes.

Laboratory tests were completed in 2012 as part of the fertility component. Over 75% of areas sampled were shown to have sufficient to excessive phosphorous levels, which led to decreased phosphorous use on those sites.

The invasive insect, brown marmorated stink bug (BMSB) has set pest management programs back 30-40 years. A trial project conducted in 2012 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 #12**

### **1. Outcome Measures**

Blueberry and Cranberry Insect Pest Management ? Towards the Development and Implementation of Reduced-Risk Strategies: 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**

<b>Year</b>	<b>Actual</b>
2012	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 is needed are these reduced-risk strategies that are expected to impact positively the environment and the well being of humans and their communities.

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

The Blueberry/Cranberry Entomology Program at Rutgers University, 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. Newsletter articles (30) were published throughout the growing season to provide information on pest management and to update findings on new pesticides. Educational sessions were regularly offered in Atlantic and Burlington Counties. These sessions provided an overview of research progress and future work. More informal twilight meetings were held during the growing season to provide seasonally-relevant pest management information.

Summer sessions directed to the community (local schools and senior institutions) were also conducted regularly during the growing season. The research program also delivered presentations at meetings to the scientific community.

**Results**

Researchers and Extension faculty/staff 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, resulting in positive environmental impact and the well-being of humans and their communities.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
216	Integrated Pest Management Systems

**Outcome #13**

**1. Outcome Measures**

Developing and Implementing Integrated Pest Management Strategies : 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
2012	0

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

**Issue (Who cares and Why)**

Developing and Implementing Integrated Pest Management Strategies



Our society is facing increasing urban pest problems as more houses are built, more people are living closely with the natural environment and more travel and international economic activities are occurring each year. 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. Pesticide use for controlling urban pests often pollute the environments, pose risks to human and pets, and lead to insecticide resistance. The public needs to understand biology pests, pest control methods, and insecticides to reduce pests, reduce diseases vectored by urban pests, and minimize health risks associated with pesticide applications.

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

NJAES conducted bed bug behavior and management research. In the laboratory, we studied different bed bug monitor design, different lure formulations, and different carbon dioxide sources. We trained staff from public housing authorities on bed bug prevention and control. The objective was to provide housing authority staff necessary knowledge on bed bug prevention and control with the goal of improving their ability to combat the increasing bed bug infestations and reduce the cost and bed bug control.

#### **Results**

A bed bug lure technology was licensed to two private companies. A patent application was filed to U.S. Patent Office.

A home-made, simple bed bug monitoring system developed in our laboratory provided to be at least as effective as the commercial active bed bug monitors. It represents 95% cost savings compared with the most effective commercial active bed bug monitor.

Implementing a bed bug management program in a 223-unit apartment building for 12 months resulted in 27% reduction in infestation rate and 83% reduction of apartments with medium or high bed bug infestations. Interviews of 89 residents in the building showed that 90% of them are satisfactory with our bed bug management program implemented in that building.

A new bed bug treatment technique (dust band) was tested and found it was as effective as integrated pest management which includes both chemical and non-chemical treatments. The results were published in a peer-reviewed journal.

Our bed bug video titled "Bed bugs and integrated pest management" received approximately 3,000 views as of December 2012 (not including on-site shows). The second video titled "Bed Bug management for Professionals" received approximately 500 views as of December 2012.

A survey of audience who watched our short bed bug video shows that 100% of the 250 surveyed people think the video material is useful and will recommend to others.

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

<b>KA Code</b>	<b>Knowledge Area</b>
216	Integrated Pest Management Systems

## **Outcome #14**

### **1. Outcome Measures**

Weed Control in Vegetables, Tree Fruit, Small Fruit, and Cranberries: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

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

Weed Control in Vegetables, Tree Fruit, Small Fruit, and Cranberries

The cost of controlling weeds in vegetable and fruit crops continues to affect the profitability of these crops for New Jersey growers. Manufacturers continue to cancel registrations on old herbicides due to loss of market share in the major markets.

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

Alion has been recommended in blueberries, and recommendations for use in vineyards, pome fruits and stone fruits. Research conducted at Rutgers Agricultural research and Extension Center in growers orchards and vineyards supported the use of Alion in late fall or early spring for annual weed control. Alion is most consistent when applied in late fall, when rainfall to activate the herbicide is assured.

The Callisto label has been expanded to include blueberries and cranberries, including newly planted cranberry bogs. In blueberries, the target weeds are common lambsquarter and other annual broadleaf weeds. The minor crop labels for the use of Callisto on cranberries was the result of a nation-wide cooperative effort between university faculty, government agencies such as IR-4 and the EPA, and industry. The effort was initiated by the innovative and accurate results of the weed control research conducted at Rutgers NJAES.

Fluroxypyr (Quinstar 4F) has received a federal label for use in cranberries to control dodder, and many other annual and certain perennial weeds, including yellow loostrike (swamp candle), the most widespread weed in cranberries, worldwide. The label effort was initiated by the innovative and accurate results of the weed control research conducted at Rutgers NJAES.

**Results**

Several new herbicides, and new registrations for old herbicides will be recommended in New Jersey as a result of research conducted at Rutgers.

Weed control will be improved. Crop yield and quality will be increased. Farm profits will be increased. Soils will be improved. Herbicide use will be reduced.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

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

**Evaluation Results**

See Qualitative Outcomes

**Key Items of Evaluation**

See Qualitative Outcomes

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

**Program # 8**

**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%	
	<b>Total</b>	100%		100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	4.8	0.0
Actual Paid Professional	6.0	0.0	3.0	0.0
Actual Volunteer	230.0	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
37989	0	96375	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
508046	0	918377	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
115477	0	951543	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**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	144	83	0	0

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

**Patent Applications Submitted**

Year: 2012

Actual: 1

**Patents listed**

8183395 B2

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

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
<b>Actual</b>	2	48	50

**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.

<b>Year</b>	<b>Actual</b>
2012	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	Shellfish Genetics and Breeding for Aquaculture: 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.
5	Development and Testing of Modern Biological Reference Point Management Techniques for Diseased Oyster Populations: 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.
6	Marine Natural Product Discovery in Extreme Environments: 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.
7	Barnegat Bay Shellfish Restoration Program: 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.

**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.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2012	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
135	Aquatic and Terrestrial Wildlife



## **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**

<b>Year</b>	<b>Actual</b>
2012	0

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

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

National Animal Genome Research Project (NRSP-\*): Aquaculture Genomics (Oysters)

New Jersey's aquaculture resources are finite and can sustain on fixed harvests, while the demand for quality fish and seafood continues to climb. Threats from disease and environmental contaminants and conditions provide additional challenges to producers to meet the demand for quality aquaculture products. In particular, shellfish resources along much of the Atlantic Coast have been devastated by diseases.

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

This project is part of the USDA National Research Support Project (NRSP-8) on animal genomes. The national project is designed to coordinate research efforts in animal genomics and facilitate exchanges of ideas and data. NJAES conducted research on genomics of molluscs under projects funded by National Oceanic and Atmospheric Administration (NOAA) Sea Grant, United State Department of Agriculture (USDA), National Science Foundation (NSF) and Rutgers University, in collaboration with colleagues in 2011: 1) we identified and mapped disease resistance genes and makers, and used them to model disease resistance in eastern oyster populations; 2) we worked on the development of Single-Nucleotide Polymorphism (SNP) marker and a cytogenetic map for the Pacific oyster; 3) we worked on assembly and annotation of the Pacific oyster genome; and 4) we attended the annual meeting of NRSP-8 held in San Diego, January 2011. The outputs have been disseminated to the research community through workshops, meeting presentations and publications.

#### **Results**

Identified 14 loci for Dermo disease resistance, which improved our understanding of genetics of Dermo resistance. A preliminary cytogenetic map has been developed for the Pacific oyster, which is the first for this species. This map will provide physical anchors of the genetic and sequence maps of this species. We have assembled and annotated the Pacific oyster genome, which will provide a valuable resource for the scientific community.

#### 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
2012	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**  
135            Aquatic and Terrestrial Wildlife

**Outcome #4**

**1. Outcome Measures**

Shellfish Genetics and Breeding for Aquaculture: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Shellfish Genetics and Breeding for Aquaculture

Molluscan shellfish are important marine resources, supporting major aquaculture and fishery industries in the US and around the world. There are a number of problems and challenges facing the shellfish aquaculture industry, where genetics can be part of the solution.

**What has been done**

NJAES researchers: 1) developed disease-resistant and fast-growing strains by hybridization and selective breeding; 2) developed sterile and superior stocks using the triploid-tetraploid technology; 3) molecular tools for the genetic mapping and improvement of commercially important traits. In 2012, NJAES conducted research under support from USDA/Northeastern regional Agriculture Center (NRAC) and NSF: 1) we continued selective breeding of disease-resistant eastern oysters and performed field evaluations; 2) we provided the latest disease-resistant tetraploid eastern oysters to the industry for triploid production; 3) we identified disease-resistance genes in the eastern oyster; 4) we studied population genetics of oysters in Delaware Bay; and 5) we participated in the international oyster genome project, which completed the sequencing of the Pacific oyster genome. The outputs were published and/or presented to the shellfish research and culture community at meetings including the annual meetings of the National Shellfisheries Association and the Milford Aquaculture Seminar.

**Results**

The disease-resistant eastern oysters developed from our research program have become valuable stocks for oyster farming along the northeastern coast. We distributed disease-resistant broodstock in both diploid and tetraploid forms. The tetraploids are used to produce triploid oysters which grow significantly faster than diploids. The oyster genome has been published in a recent article in Nature, which is a significant milestone in oyster genomics and will enable a wide range of genetic research and analyses.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
135	Aquatic and Terrestrial Wildlife

**Outcome #5**

**1. Outcome Measures**

Development and Testing of Modern Biological Reference Point Management Techniques for Diseased Oyster Populations: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Development and Testing of Modern Biological Reference Point Management Techniques for Diseased Oyster Populations

New Jersey's aquaculture resources are finite and can sustain on fixed harvests, while the demand for quality fish and seafood continues to climb. Threats from disease and environmental contaminants and conditions provide additional challenges to producers to meet the demand for quality aquaculture products. In particular, shellfish resources along much of the Atlantic Coast have been devastated by diseases.

### **What has been done**

NJAES researchers developed and tested numerical models designed for bivalves to address challenges specific to the management of these species. Gene-based population dynamics models were developed and used to evaluate genetic effects of management options on stocks. A gene-based population dynamics model, configured for *C. virginica*, was used to simulate the development of disease resistance using mortality as a selection agent. Simulated populations were exposed to four levels of mortality covering the range in mortality observed in Delaware Bay in the 1990s.

In conjunction with our research, we implemented annual stock assessment surveys that encompassed oyster beds in Delaware Bay. Analyses included quantitative abundance, size frequency, condition, and mortality at 160 randomly selected sites among these beds. We convened a Stock Assessment Workshop each February to review the assessment and develop a status of the stock report and management advice. During this assessment process, biological reference points are reviewed and revised, and management recommendations were formulated for the next New Jersey oyster harvest.

### **Results**

The scientific data generated by this research program has permitted increased accuracy in the survey and stock assessment that supports the Delaware Bay oyster industry. By informing sound aquaculture management methods, this research, in conjunction with federal and state actions and activity and improved consumer demand for oysters, helped to bring the oyster industry in the Delaware Bay back from a near collapse resulting from the impact of Dermo, a parasitic pathogenic oyster disease, that struck bay oyster beds in the 1990s. Oyster production over the last ten years in the bay averaged 72,000 bushels per year, compared to 36,600 bushels per year in the 1990s. Today, the oyster industry generates \$4 million in revenues each year for oyster growers in the Delaware Bay area, as well as a combined total of \$20 million each year in economic activity in Southern New Jersey among the state's poorest counties.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
135	Aquatic and Terrestrial Wildlife

## **Outcome #6**

### **1. Outcome Measures**

Marine Natural Product Discovery in Extreme Environments: 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
2012	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Marine Natural Product Discovery in Extreme Environments

Cancer is a major disease affecting a larger portion of the American population resulting in high mortality rates for both men and women. Deep sea habitats have the potential for commercial development of pharmaceuticals, particularly those with anti-cancer activity.

#### What has been done

Research under the auspices of the Center for Deep-Sea Ecology and Biotechnology of the New Jersey Agricultural Experiment Station and the School of Environmental and Biological Sciences are as follows: (1) screening extracts of cultured novel species bacteria from deep-sea hydrothermal vents, as well as screening extracts of invertebrate mussels from hydrothermal vent habitats for bioactive compounds; (2) performing cytotoxic and induction of apoptosis assay of extracts, fractions and isolated molecules in conjunction and collaboration with the Cancer Institute of NJ and the University of Medicine and Dentistry of NJ; (3) isolation and culturing numerous micro-organisms from a variety of extreme deep-sea hydrothermal vent environments; (4) identifying the structure of bioactive compounds and specifically those with apoptosis induction activity; (5) synthesizing new and unusual molecular structures with potential anticancer activity for drug development and pharmaceuticals in conjunction with the Department of Chemistry at Rutgers University. Our ongoing search for marine natural product development initiatives continues to focus on discovering new anti-bacterial and anti-cancer leads. During 2012, a paper was published in the high impact journal "Marine Drugs" (Ammonificins C and D, Hydroxyethylamine Chromene Derivatives from a Cultured Marine Hydrothermal Vent Bacterium, *Thermovibrio ammonificans*). A new US patent has been issued on our work for "composition and methods for treating cancer". Educational outreach efforts continue to be focused on distribution of Blu-ray, NTSC and 8/70 formatted version of the IMAX film "Volcanoes of the Deep Sea" to museums, science centers and zoos that have not yet featured the film at their institutions. The film played for a period of a year (2011-2012) at the Tom Ridge Environmental Center MEGA Theater in Erie, PA and the Clay Center for the Sciences in Charleston, WV has agreed to show the film beginning in March 2013. The film continues to be shown on a wide variety of PBS and other channels, including Discovery Canada, Discovery USA, Direct TV, Comcast, Echo Star and CBS affiliate stations in the US and it is estimated that the film has been viewed to date by in excess of 175 million individuals worldwide.

#### Results

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 product discovery have 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. The continuing distribution of DVD copies of our Rutgers-produced IMAX film "Volcanoes of the Deep Sea"; viewings on a wide variety of television broadcasts worldwide; and continued showings of the film at major science centers should expose additional millions of individuals to our ongoing initiatives under this NJAES Project.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

#### Outcome #7

##### 1. Outcome Measures

Barnegat Bay Shellfish Restoration Program: 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
2012	0

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

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

Barnegat Bay Shellfish Restoration Program

New Jersey's aquaculture resources are finite and can sustain on fixed harvests, while the demand for quality fish and seafood continues to climb. Threats from disease and environmental contaminants and conditions provide additional challenges to producers to meet the demand for quality aquaculture products. In particular, shellfish resources along much of the Atlantic Coast have been devastated by diseases.

**What has been done**

The mission of the Barnegat Bay Shellfish Restoration Program (BBSRP), and ReClam The Bay, Inc. (RCTB), the volunteer organization which supports the efforts of BBSRP, is to teach about the coastal bay, its watersheds and peoples? impact on these natural resources by using the hard clam and oyster as living representatives of the bay ecosystem. The program uses typical commercial shellfish aquaculture techniques to produce the clams and oysters used as teaching tools for the public.

2012 saw a big increase of outreach to school children. The public schools that have participated in our ?Shellfish in the Classroom? are very enthusiastic. This program brings baby clams and oysters into the classroom so students can learn about how those creatures live and what needs to be done to increase the populations of shellfish in Barnegat Bay and why that is important.

**Results**

Mainly through communication with stakeholders at the upweller boxes and at the fairs and festivals, and from responses from agencies or groups with whom the program is involved, it is quite evident that the message about how actions of the public in the watershed can impact the bay itself is getting across. Public sentiment about helping the Barnegat Bay is growing because of the numerous articles that are being produced by the local print media helps to spread the message and educate about water quality and how people should change their behavior.

BBSRP/RCTB members are really environmental stewards. They reached out to about 9,500 people in 2011. In all, 5,120 hours are reported. That correlates to over \$128,000 in volunteer services.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

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



**Evaluation Results**

See Qualitative Outcomes

**Key Items of Evaluation**

See Qualitative Outcomes

**V(A). Planned Program (Summary)****Program # 9****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
101	Appraisal of Soil Resources	10%		5%	
102	Soil, Plant, Water, Nutrient Relationships	5%		5%	
104	Protect Soil from Harmful Effects of Natural Elements	5%		5%	
311	Animal Diseases	0%		5%	
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals	0%		5%	
404	Instrumentation and Control Systems	0%		5%	
501	New and Improved Food Processing Technologies	5%		10%	
502	New and Improved Food Products	10%		10%	
503	Quality Maintenance in Storing and Marketing Food Products	10%		5%	
504	Home and Commercial Food Service	15%		10%	
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	5%		5%	
723	Hazards to Human Health and Safety	15%		10%	
	<b>Total</b>	100%		100%	

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

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

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	3.0	0.0	4.0	0.0

Actual Paid Professional	3.4	0.0	4.4	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
53893	0	232072	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
310165	0	973443	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
18289	0	543564	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 practices.
- Design strategies, tools and processes to detect and eliminate pathogens, chemical and physical contaminants during production, transportation, processing and preparation of food.
- Investigate 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 communities
- 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**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	100	0	0

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

Year: 2012  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
Actual	17	22	39

**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**  
 2012                              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	Food Safety Cognitions of Middle Schoolers and Parents of Middle Schoolers: Medium Term - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.
5	Developing a Food Safety Extension Program that Supports Small Farms: Medium Term - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.
6	Biosecurity Communications Research and Practices: Medium Term - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.
7	Modeling and Risk Assessment of Food Safety: Medium Term - Adoption of safe food handling practices at the individual, family, community, production and supply system levels.

**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.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	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**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
314	Toxic Chemicals, Poisonous Plants, Naturally Occurring Toxins, and Other Hazards Affecting Animals
501	New and Improved Food Processing Technologies
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

**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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Control of Food-Borne Pathogens in Pre- and Post-Harvest Environments

The wholesale 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 three years.

**What has been done**

Experiments were conducted related to modeling the microbial safety of fresh produce; modeling the risk associated with hand washing and cross contamination in kitchen environments; modeling norovirus transmission in foodservice settings; using risk assessment to develop scientifically-based consensus food safety metrics for tomatoes; Enhancing microbial safety of fresh-cut fruit and vegetable salads using modeling and risk assessment; Validation of bacterial surrogates for the survival of norovirus on food contact surfaces; and validation of a mathematical model for holding cold foods without temperature control (ground beef and Salmonella). Eight graduate students were specifically mentored as part of these projects. Seven graduate students were given instruction in quantitative microbial risk assessment as part of special topics class offered through the food science graduate program. Four presentations were given at the International Association for Food Protection annual conference in Providence, Rhode Island in July 2012.

**Results**

Changes in knowledge occurred in the 7 graduate students studying quantitative microbial risk assessment through the special research topics course. Students gained knowledge regarding the use of quantitative microbial risk assessment in developing food safety policy. Students also

improved their skills in conducting quantitative microbial risk assessment. Several students gained new applied knowledge through their research, and more than 12 draft publications are in preparation.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
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
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

<b>Year</b>	<b>Actual</b>
2012	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



<b>KA Code</b>	<b>Knowledge Area</b>
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**

Food Safety Cognitions of Middle Schoolers and Parents of Middle Schoolers: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

Food Safety Cognitions of Middle Schoolers and Parents of Middle Schoolers

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. Moreover, the most common jobs held by youth are in the food service industry, ranging from cashier to table buser to server to cook. Changes in the educational system, that once taught food safety in family and consumer sciences classes in virtually every secondary school, have resulted in a reduction or even elimination of such courses over the past two decades. Opportunities for children to learn safe food handling via observation have diminished as more mothers have taken employment outside the home and as the reliance on fully or partially pre-prepared convenience foods have increased. As a result, a large proportion of teens and adults have limited food preparation experience, have never learned basic food safety principles, and, thus, lack critical knowledge needed to proactively protect themselves and their future families. These societal changes indicate that the risk of foodborne illness arising from unsafe food handling in the home is likely to rise.

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

The game was evaluated with 1,268 students to promote a greater understanding of food safety knowledge and intended behavior among youth, a computer education game (Ninja Kitchen) was developed in collaboration with New Mexico State University and implemented in two states (NJ and TX) and to assess food safety knowledge, psychographic characteristics, and usual and intended behaviors.

#### **Results**

Linear mixed-effects models, controlling for gender, grade, and geographic location revealed significant time by group effects for knowledge of safe cooking temperatures for animal proteins and danger zone hazard prevention, and usual produce washing behaviors. Pairwise comparisons, adjusted for multiple comparisons, indicated that after playing the game, the experimental group felt more susceptible to foodborne illness, had stronger attitudes toward the importance of handling food safely and handwashing, had greater confidence in their ability to practice safe food handling, and had greater intentions to practice handwashing and safe food handling. Teachers and students found the game highly acceptable.

The game has the potential to promote positive food safety behaviors among youth in a fun and educational format. The Ninja Kitchen video game (freely available at [www.ninjakitchengame.org](http://www.ninjakitchengame.org)) is a unique tool that can help middle schoolers develop the cognitions needed to practice safe food handling and reduce the risk of foodborne illness.

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

<b>KA Code</b>	<b>Knowledge Area</b>
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
723	Hazards to Human Health and Safety

**Outcome #5**

**1. Outcome Measures**

Developing a Food Safety Extension Program that Supports Small Farms: 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
2012	0

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

**Issue (Who cares and Why)**

Developing a Food Safety Extension Program that Supports Small Farms

An increasing number of wholesale producers are required to comply with a third party food safety audit, currently enforced by wholesale buyers. Many wholesale growers and some direct market producers in the state will be affected by the impending Food and Drug Administration (FDA) Food Safety Modernization Act regulations.

**What has been done**

Extension Agricultural Agents prepared growers in the state for audits through educational programming, farm food safety plan creation assistance, farm food safety walk through, Plant and Pest Advisory articles, document templates and general question support. Prepare growers for compliance with government and business regulations.

Twenty-seven articles focusing on the creation of a farm food safety plan were published in the vegetable crops edition of the Plant and Pest Advisory. Growers were also reached at the Vegetable Growers Association of New Jersey, The Direct Farm Market Association, Rutgers Agritourism educational events, Annie's Project NJ, the NJ Agriculture Convention and Trade Show, the Mid-Atlantic Vegetable Meeting and other regional meetings through educational programming, program overviews and convention displays.

**Results**

Analysis of outreach efforts directly with farmers, including audit preparation certification, farm walkthroughs and farm food safety plan review have been highly successful. 100% of growers utilizing the above have passed their third party audit.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
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
723	Hazards to Human Health and Safety

#### Outcome #6

##### 1. Outcome Measures

Biosecurity Communications Research and Practices: 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
2012	0

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

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

Biosecurity Communications Research and Practices

While the food system in the United States is the safest in the world, food safety concerns continue to threaten the health of families and individuals. Foodborne pathogens, improper food handling and environmental factors can result in foodborne illness and even death. The CDC reports numerous cases of foodborne illness each year. Research shows that consumers either do not know appropriate food handling practices or that they say one thing or do another. Foodborne illness has both health and economic consequences.

There is an increased interest in home food preservation - canning and freezing in recent years. 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**

through a combination of national surveys, qualitative interviews, and media content analysis, researchers at the Rutgers Food Policy Institute addressed many of the objectives of this multi-state project on biosecurity communication. NJAES researchers completed a study concerning how consumers respond to food recalls, as well as a white paper on how government and industry communicators can better respond to public needs for information during outbreaks of foodborne illness or food recalls. A final survey was conducted, which utilized an experimental design to test features of communication about intentional and unintentional food contamination.

**Results**

The research from this project has had an impact on the field of communicating with the American public about food contamination. By providing practical guidance about the communication process, as well as best practices regarding the content of food contamination risk messages, this research program has filled an important gap. For example, the Partnership for Food Safety Education developed a new awareness campaign that is based in part on this research.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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
723	Hazards to Human Health and Safety

**Outcome #7**

**1. Outcome Measures**

Modeling and Risk Assessment of Food Safety: 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**

<b>Year</b>	<b>Actual</b>
2012	0

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

**Issue (Who cares and Why)**

### Modeling and Risk Assessment of Food Safety

Food manufacturers are under a variety of regulatory, economic and environmental pressures. Retaining a strong manufacturing base still an essential component for the state's economic growth.

#### What has been done

NJAES Extension Specialist in Food Science continually assists the industry through short courses; in the current reporting year there were five different instances where his one-on-one assistance had a specific and direct economic benefit to NJ companies. In 2012, he assisted NJ-based companies with a *Listeria monocytogenes*-related recall; with the development of food safety plan; with application of mathematical modeling for shelf life and stability of consumer products; with response to a USDA FSIS audit and with evaluations of novel process for reduction of pathogen load in herbal teas. These outputs were directly based on the "modeling and risk assessment of food safety risks" research lab.

#### Results

In addition to the assistance provided to NJ-based companies, as time allows, the Extension Specialist also provides technical assistance to other states and internationally. Eleven such examples occurred in 2012 with assistance provided to companies or groups based in Washington, DC, California, Georgia and New York. Technical assistance with a specific economic benefit was provided to companies in Pennsylvania, Utah, South Dakota and New York. This assistance saved these companies more than an estimated \$300,000. These impacts were directly based on the "modeling and risk assessment of food safety risks" work conducted at NJAES.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
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
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

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

**Evaluation Results**

See Qualitative Outcomes

**Key Items of Evaluation**

See Qualitative Outcomes

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

**Program # 10**

**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%	
	<b>Total</b>	100%		100%	

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

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

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	0.0	2.0	0.0
Actual Paid Professional	3.9	0.0	1.4	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
36530	0	51508	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
476444	0	356546	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
6235	0	150	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
- Entrepreneurs
- Policy and decision makers

**3. How was eXtension used?**

Farm Energy CoP  
 Faculty developed collaborative educational products.

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

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	305	304	0	0

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

**Patent Applications Submitted**

Year: 2012  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
<b>Actual</b>	5	10	15

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

**Output Target**

**Output #1**

**Output Measure**

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

<b>Year</b>	<b>Actual</b>
2012	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.

**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.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2012	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 #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
2012	0

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Renewable Energy Education and Technical Assistance

Farmers and other involved in agriculture throughout New Jersey rely on substantial energy inputs to operate their businesses. With rising energy prices conservation and new economical sources of energy are needed.

#### What has been done

The program goal was to enhance New Jersey National Resources Concentration Service (NRCS) staff and their clientele awareness and knowledge of agriculture energy conservation and alternatives through the development and dissemination of two workshops, 10 fact sheets and a demonstration video.

#### Results

USDA-NRCS staff in New Jersey increased their awareness and knowledge of energy conservation and renewable alternatives. They will now be increasing their efforts in conducting/sponsoring Farm Energy Audits and implementing programs on individual farms to reduce fossil fuel energy consumption.

## 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**

<b>Year</b>	<b>Actual</b>
2012	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**

<b>KA Code</b>	<b>Knowledge Area</b>
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**

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

**Evaluation Results**

See Qualitative Outcomes

**Key Items of Evaluation**

See Qualitative Outcomes