

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Global Food Security and Hunger - Agricultural Viability

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
205	Plant Management Systems	20%		20%	
211	Insects, Mites, and Other Arthropods Affecting Plants	20%		20%	
215	Biological Control of Pests Affecting Plants	20%		20%	
601	Economics of Agricultural Production and Farm Management	20%		20%	
604	Marketing and Distribution Practices	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	65.0	0.0	36.0	0.0
Actual Paid	40.0	0.0	16.0	0.0
Actual Volunteer	2584.0	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
840115	0	1232397	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
3932462	0	5008696	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
476087	0	2328981	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?

Faculty participated in answering "ask the expert" questions, learn professional sessions and the development of collaborative educational products.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	125383	0	16073	0

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

Patent Applications Submitted

Year: 2014

Actual: 38

Patents listed

8642769
 8721767
 8753642
 4599872
 201200019
 201100393
 201100381
 201100252
 201200020
 200900136
 201000094
 201100364
 201100365
 201100363
 201200486
 200900347
 200900343
 201200487
 201200123
 201300356
 201300368
 201400071
 201400137
 201400191
 201400206
 201400224
 201400236
 201400070
 201400404
 201400405
 201400510
 201400511
 201400133
 201400138
 201400346
 201400298
 201400002
 13999932

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	85	91	176

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
2014	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	Evolution and Epidemiology of Emerging Single-Stranded DNA Viruses that Threaten New Jersey Agriculture - 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	Mid Atlantic Secure Milk Supply Project - 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	National Youth Agri-Science Summit - 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

	<p>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.</p>
7	<p>Ensuring the Sustainability of the New Jersey Horse-racing Industry - 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.</p>
8	<p>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.</p>
9	<p>2014 Sclerotinia Sclerotiorum (White Mold) Resistance Trial in Soybeans - 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.</p>
10	<p>Statewide Pomology and Viticulture Extension - 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.</p>
11	<p>4-H Animal Science Programs - 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</p>

	<p>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.</p>
12	<p>Annie's Project New Jersey and Beyond - 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.</p>
13	<p>Crop Insurance Education of NJ Farmers - 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.</p>
14	<p>Pepper Evaluations for Phenotypic Traits, Physiological Disorders, Diseases and Cultural Practices - 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.</p>
15	<p>Rutgers NJAES Strawberry Variety Release Project - 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.</p>
16	<p>Weed Control in Vegetables and Fruit - 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.</p>
17	<p>Resistance Management for Fresh-Market and Processing Vegetable Crops in New Jersey - 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.</p>
18	<p>Improving Economic and Environmental Sustainability in Tree Fruit Production through Changes in Rootstock Use - 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.</p>
19	<p>Extend and Maximize the Post-Harvest Quality of High Value and Perishable Crops - 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.</p>
20	<p>Metabonomic Detection of Abnormalities in Horses: A search for Early Diagnoses and Dietary Intervention and Potential Models for Human Disorders - 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)</p>

	and will support the agricultural industry socially, politically and economically.
21	Genetic Improvement of Woody Plants (Trees and Shrubs) for Ornamental Uses - 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.
22	Fungicides and Vegetables - 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.
23	Antioxidant Supplements, Oxidative Stress and Muscle Oxidation in the Young Racehorse - 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.
24	Weed Control in Cranberries - 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.
25	Molecular Mechanisms Regulating Skeletal Muscle Growth and Differentiation - 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.
26	Conservation and Utilization of Plant Genetic Resources - 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.
27	Turfgrass Breeding - 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.
28	Improving Sustainability, Efficiency, and Efficacy of Peach Disease Management Strategies: Biofungicides, Conventional Fungicides, and Abiotic Environmental Factors - 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.
29	Nuances of Marketing Ethnic Specialty Vegetables and Herbs - 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.

Outcome #1

1. Outcome Measures

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

Sustainable ag and organic ag production methods New crops and use/alternative crops

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Development of an Efficient Clonal Propagation Method for Asparagus Propagation and Use It to Generate Heat, Salt and Drought Tolerant Asparagus Parental Lines

Asparagus has become an increasingly popular vegetable among consumers worldwide. Consumption in the United States alone has almost doubled since 1990. Once regarded as upscale and expensive, asparagus consumption has grown in part because it is rich in important nutrients and minerals, including folic acid, protein, betacarotene, niacin, Vitamin a, Vitamin C, Vitamin E., Vitamin K and dietary fiber, among others. Within the United States, asparagus production is largely concentrated in four states: California, Michigan, New Jersey, and Washington. Domestic production is insufficient to meet domestic demand, and the United States is the world's largest importer of asparagus.

What has been done

NJAES researcher is exploring the use of somatic embryogenesis for large-scale clonal propagation of asparagus.

Results

NJAES researchers have developed an effective and efficient somatic embryogenesis protocol that can produce clones ready to be transferred to greenhouse established an efficient protocol for generation of asparagus somatic embryos. This procedure has the potential to facilitate production of a large number of parent plants in much shorter time. This will decrease costs of production for U.S. asparagus producers, allowing them to expand production to better meet domestic demand for this increasingly popular vegetable. Since somatic embryogenesis can be an efficient tool to recover plants from mutant cells that exhibit desirable traits such as better tolerance to heat and drought, this method can also be used in asparagus breeding programs to develop new and improved varieties of asparagus that are better adapted to changing growing conditions as a result of climate change and other factors.

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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Milk Quality

The number of New Jersey dairies now totals 65 farms statewide. With the high fluid milk demand in the state, it is important that these remaining farms remain in the state and provide as much milk as possible to support the economy within the state. Even beyond the sale of milk, New Jersey dairymen support many other industries in the state in order to remain profitable.

What has been done

By using cow side tests for parameters such as somatic cell count and bacterial levels, producers were able to identify and address issues before they became major problems. All New Jersey dairy producers had access to two in state analytical labs (New Jersey Department of Agriculture Lab in Trenton-official and Rutgers Cooperative Extension of Salem County lab-unofficial) to identify microorganisms responsible for issues found on farm.

Beyond the milk itself, the washing cycle of the milking system was monitored using a specialized piece of equipment called a LactoCorder. Cow comfort and housing conditions were also monitored using Hobo devices which logged temperature, humidity and light intensity so that housing conditions could be amended to accommodate the cows.

Results

In 2014, over 50% of New Jersey dairies participated in the milk quality program performed by Rutgers Cooperative Extension of Salem County. All participating farms were able to maintain somatic cell count under 400,000 in order to receive milk premium bonuses. Milk samples were taken from 36 farms (55% of New Jersey dairies) across the state for analysis including somatic cell counts and culturing for microorganisms. With the control and elimination of contagious mastitis microorganisms, overall herd health improved within herds that had tested positive. Bulk tank monitoring took place in 2014 where 27 farms statewide participated. The testing was done to identify microorganisms present in the milk and the overall quality of the product. When an issue was identified, further steps were taken to remediate any problems found. During 2014, Rutgers Cooperative Extension of Salem County assisted 14 dairymen statewide who had PIC issues. In all cases, careful inspections took place to pinpoint the cause of the inflated PIC counts and sampling also took place. In all cases, potential solutions were suggested and enacted and the PIC counts fell back to acceptable levels.

With the improvement of cow housing conditions, milk production improves, leading to more milk in the bulk tank and a bigger milk check.

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

Evolution and Epidemiology of Emerging Single-Stranded DNA Viruses that Threaten New Jersey Agriculture - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Evolution and Epidemiology of Emerging Single-Stranded DNA Viruses that Threaten New Jersey Agriculture

Many of the emergent diseases of crops and livestock are caused by a group of viruses that we know little about: the single-stranded DNA (ssDNA) viruses. Whitefly-transmitted geminiviruses are the largest pathogen threat to crops worldwide, and have become particularly prevalent in the United States due to the recent introduction of a two polyphagous, Mediterranean biotypes (B and Q) of the whitefly *Bemisia tabaci*. Critically, despite these well-established threats, our biggest agricultural liabilities may lie in unknown ssDNA viruses; it is becoming clear that we have not characterized a large fraction of the diversity of geminiviruses, especially in North and South America. There is a need to identify which geminiviruses are already present in the United States, and to understand how single-stranded DNA viruses spread and adapt quickly to novel hosts. This is especially important as the invasive Q biotype whitefly has already been found in northeastern states like NJ, and will likely become more prevalent as climate change makes this region a more hospitable habitat for these disease vectors.

What has been done

Current NJAES research project attacks several aspects of this emerging problem in US agriculture, using leaf tissue collections, laboratory analysis, statistical models and epidemiological methods to document the who, where, and how of begomovirus emergence in the United States.

Results

Over the past few year, an NJAES researcher has made significant advances in elucidating the mutational mechanisms that allow ssDNA viruses to evolve as quickly as RNA viruses, quantifying how important mutation is to begomovirus evolution, surveying the worldwide diversity of begomoviruses, and studying the movement of begomoviruses among countries and continents. As a result of this research, we now have proof of concept data that suggests ssDNA viruses can be controlled through increasing their mutation rate, an antiviral strategy that has proved effective against RNA viruses.

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

Mid Atlantic Secure Milk Supply Project - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Mid Atlantic Secure Milk Supply Project

Foot-and-mouth disease (FMD), sometimes referred to as "hoof and mouth", is a highly contagious viral disease of cattle and other cloven-hooved animals such as pigs, sheep, and goats. FMD is not a public health concern and does not affect food safety however hoof and mouth outbreaks can cause mass panic among milk consumers which could lead to severe decreases in milk consumption which could be devastating for the dairy industry.

What has been done

Rutgers Cooperative Extension Agricultural Agent and staff researched New Jersey dairy farmers with information about the secure milk supply plan. Educational programs were conducted to prepare any interested dairy producer for a hoof and mouth outbreak by ensuring that they were in compliance with the secure milk supply plan permit procedures so that they could receive a permit to continue to move milk in times of an outbreak as long as their farm wasn't infected. Furthermore milk haulers, milk processors and other dairy industry business professionals were made aware of the rules of the secure milk supply plan and also to ensure that any interested milk hauler or milk processor parties were in compliance with the secure milk supply permitting procedures so that they too could move and receive milk in times of a hoof and mouth outbreak. Outreach included bi-monthly newsletters, speaking to farmers one on one about the SMS plan, writing and placing publications in the dairy newsletter, on regional and state conference calls discussing progress of the SMS plan, visiting demo and interested dairy farms, collaborating with an interested milk processing plant to work towards implementing a plan, and specifics of a SMS plan, and researching equipment needed in order to carry out the SMS plan on the appointed demonstration farm. A farm demonstration was attended by Ag professionals, dairy producers, dairy hauler company personnel, milk processing plant personnel and representative from the NJ Department of Agriculture. This demonstration showed start to finish what steps needed to be followed in order to move milk and be permitted according to the secure milk supply plan on a dairy farm and as a milk hauler.

Results

Throughout the implementation of the Mid Atlantic Secure Milk Supply, Rutgers was able to have over 30 one on one consultations with New Jerseys Dairy producers. This yielded eight interested producers who are motivated to move forward and learn more about what is needed to create a secure milk supply plan for their farms. Demonstration attendees witnessed the standard operating procedures that need to be implemented on a dairy farm in order to continue to ship milk off farm during a hoof and mouth outbreak. RCE will continue to educate New Jerseys producers about the Mid Atlantic Secure Milk Supply Plan and to work with interested farmers as well as the interested dairy processing plant in order to ensure that all SOP's are followed for them to become permitted to ship and receive milk during a hoof and mouth outbreak.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

National Youth Agri-Science Summit - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

National Youth Agri-Science Summit

Today, many young people are generationally and geographically removed from farming and agriculture. Yet, it is vital that these young leaders and future decision makers understand the critical role of agricultural science innovation in addressing the world's most pressing problems. Through 2015, it is estimated that there will be 54,400 annual job openings for those with

agricultural college degrees. While the percentage of these opportunities in production agriculture (farming) has declined, 27% of these jobs will be in science and engineering and 47% will be in management and business. A shortfall of graduates for these science and business positions is projected, especially for the anticipated demand in animal and plant biotechnology.

What has been done

National Youth Agri-Science Summit. High school youth and their adult partners interested in becoming Champions for Agriculture in their communities attended the five-day summit held at the National 4-H Youth Conference Center in Chevy Chase, Maryland. At the conclusion of the summit teams returned to their home communities prepared to help increase the agricultural literacy of the general public as well as key local stakeholder groups. The teams learned about issues related to production of food, feed, fuel, and fiber with an emphasis on the rapidly emerging areas of animal and plant sciences and technologies. Participants were introduced to various challenges facing agriculture, including global food security and sustainability, and teens learned how they could begin to address those challenges today and in the future.

Results

Results of Pre/Post Survey of Youth Participants (n=43 matched pairs) Item Pre Post Interest, Relevance, Careers aware of a variety of areas of study I can pursue in agricultural science at colleges and universities. 3.80 4.72 I know about some of the careers available in agricultural science. 4.16 4.74 I can see myself pursuing a career in agriculture. 4.33 4.56 Agriculture science is a topic that interests me. 4.47 4.67 Agriculture science will be important in my future. 4.56 4.77 Agriculture research is useful for solving everyday problems. 4.16 4.53 Agricultural Science Knowledge and Skills I understand and can explain the role of agricultural science in our society. 3.80 4.63 I am aware of key agricultural issues facing producers. 3.74 4.70 I am aware of key agricultural issues facing consumers. 3.71 4.70 I understand the primary roles of the United States Department of Agriculture. 3.52 4.51 Community Engagement and Service I know where I can go to find people in my community who can help me plan and carry out an agricultural literacy project. 3.88 4.51 I plan to facilitate agricultural literacy activities in my community. 3.24 4.58 I am excited about the idea of sharing my knowledge of agricultural science with younger youth in my community. 4.12 4.74 Teens as Teachers I am confident I can teach others about agriculture. 3.71 4.72 I know agricultural curricula I could use to teach others about the production of food, fuel, and fiber. 3.37 4.58 I feel prepared to teach agricultural literacy concepts to others. 3.16 4.56

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

Ensuring the Sustainability of the New Jersey Horse-racing Industry - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Ensuring the Sustainability of the New Jersey Horse-racing Industry

The Equine Science Center found in 2007 that the New Jersey equine industry was valued at \$4 billion, generated \$1.1 billion annually in positive impact on the New Jersey economy, was responsible for 13,000 jobs (7,000 jobs generated by racetracks and horse racing breeding and training operations), and paid an estimated \$160 million annually in federal, state, and local taxes (\$85 million generated by equine operations and owners and \$75 million generated by New Jersey racetracks). Regarding acres, 176,000 total acres supported equine facilities, with 46,000 additional acres producing hay for horses on non-equine-related operations. This total of 222,000 acres represents more than one quarter of the state's 790,000 acres remaining in agriculture in the most densely populated state in the nation. Racing was not the only equine discipline in jeopardy if New Jersey racing was not sustained. Sport competition and recreational horse users also stood to suffer, as would traditional agricultural interests such as grain, hay, and straw farmers who continue to remain in business and maintain agriculturally productive open space due to the fact that their major customers are horse owners.

What has been done

People involved in the racing sector of the New Jersey horse industry approached the Rutgers Equine Science Center about researching the state of the industry since the Center's last white paper in 2009. Research was conducted by Center faculty, students, staff and industry constituents; the paper was published and spread widely through the Center's website and media contacts. Now the publication is being used by industry leaders to lobby for support for the industry.

Results

Industry is using this document to influence the legislature to put on the 2015 state ballot the question as to whether New Jersey voters want to expand casino gaming beyond Atlantic City.

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

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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Epidemiology and Management of Stone Fruit Diseases

Reduce loss from plant diseases on tree fruit crops; improve grower profitability; decrease pesticide usage ? results in less impact on environment & residue on foods; promotes sustainability.

What has been done

An Extension Specialist conducted studies on use of biorational materials for management of peach 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; developed and presented novel bioassay for examining fungicide residues on fruit; examined novel copper formulations for peach bacterial spot control; published research on the relative susceptibility of peach cultivars to rusty spot. Continued with year 2 of a study at a commercial Aronia (chokeberry) site with a cooperating grower. The project's objective was to determine the time of berry and foliar infection caused by a rust fungus. In addition, control with a fungicide was examined. Aronia is a potential new, high-value crop for New Jersey growers. All spray guides (peach, plum, cherry, apple, and pear) in the 2014 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 published on the quantitative ability of three organic / biorational fungicides to control the growth of *Monilinia fructicola*, causal agent of brown rot on stone fruit. This disease can cause 100% fruit loss if not properly managed.

Results

Brown rot ? Growers began adopting newer fungicide formulations and utilizing them in proposed mixture and alternating programs to fend off development of resistance by the brown rot pathogen. Outbreaks of resistant pathogens have been reported in many other peach growing regions. 2014 was a moderately favorable year for brown rot development; grower awareness of the resistance threat allowed them to take action in their disease control programs; no commercial economic losses were observed. Bacterial spot ? two year copper bactericide study demonstrated importance of using higher copper rates to significantly improved disease control and reduce yield loss. However, growers will need to be careful as increased phytotoxicity was also observed. Peach rusty spot ? growers can use announced 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 ? a few 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 #9

1. Outcome Measures

2014 Sclerotinia Sclerotiorum (White Mold) Resistance Trial in Soybeans - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

2014 Sclerotinia Sclerotiorum (White Mold) Resistance Trial in Soybeans

White mold is a soil pathogen. Wet shady conditions can lead to an abundance of white mold in the soil that can infect and devastate over 400 types of field crops consequently lowering their production yields. This mold can stay in the soil for many years consistently re-infesting the planted crop if perfect conditions exist. Decreased yields can be very financially detrimental to NJ farmers especially as they pertain to soybeans, one of the most widely produced crops around the state.

What has been done

A trial was conducted at the Snyder Research Farm in Pittstown NJ. 36 varieties of full season soybeans were planted. Data was collected on plant growth, disease severity, disease presence, purple seed stain presence per pound of seed, and bean yield with the objective of identifying varieties of soybean seeds most resistant to white mold disease. Twilight meetings and farm tours were held for bean growers in order to communicate our findings.

Results

As a direct result of the meetings farmers are now more informed when planting their own soybeans as to how to manage and plant them in order to minimize white mold infestation and spread. Minimizing white mold saves farmers money because it lessens the chance that they will suffer yield losses due to white mold infestation.

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

Statewide Pomology and Viticulture Extension - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Statewide Pomology and Viticulture Extension

The wine industry is experiencing rapid growth and many entrants into the industry need technical education and information for developing their production enterprises. New grape growers are coming from divergent backgrounds and need a wide range of help from basic agricultural information to highly technical information specific to wine grapes in New Jersey. Grape production in New Jersey is costly and risky, for it to be sustainable many decisions need to be made correctly and many efficiencies need to be exploited.

What has been done

A series of educational programs has been conducted or planned and several educational resources are being delivered via a website. A symposium was held where experienced national speakers as well as local experts educated growers and winemakers about new grape cultivars and global cultivars of interest to New Jersey. Two environmental events (a Winter freeze and a Summer hailstorm) eliminated field trial data from this year, so research projects are continuing with a one-year gap.

Results

This project has changed the understanding and awareness of the target audience with regard to the suitability of some previously untested wine grape cultivars for New Jersey. Furthermore, the sensitivity of wine grapes to some phytotoxic agents has been revealed during the course of the project. An enhanced understanding of winter freeze injury to a range of cultivars has been achieved.

4. Associated Knowledge Areas

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

Outcome #11

1. Outcome Measures

4-H Animal Science Programs - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

4-H Animal Science Programs

New Jersey is a state with a rich history of agricultural roots, however, New Jersey is becoming an ever more urbanized state. Youth interested in learning agricultural practices, especially related to large animals, have increased difficulty finding that information. 4-H animal projects is one of those options.

What has been done

Numerous educational events and competitions at the county, state level and national level designed to provide experimental activities with live animals, hands-on workshops, computer simulations, skill-a-thon stations, quiz bowls, and symposiums were held. Members, parents and volunteers focused on youth increasing their awareness and understanding of current issues in the animal industry and the breath of career opportunities in the animal industry. Youth practice oral and written skills, apply ethics and good sportsmanship, personal responsibility and self-discipline.

Results

Participants responding to an evaluation of a state equine event when asked to list 1 thing they learn; 32% indicated they will use the equine knowledge that have gained from this experience in their career (several indicated they wish to be a veterinarian in the future) 28% indicated they learned to work as a team 21% indicated they learned a great deal about the anatomy of the horse 21% indicated they will use this information in college 13% indicated they gained valuable communication skills. As a result of their participation in the 4-H goat project, during the year, members agreed or strongly agreed that they: ? 92% improved teamwork skills. ?89% improved leadership skills. ?85% gained the skills necessary to safely care for their goat(s). ?85% improved record keeping skills. ?84% gained knowledge of goat care and management practices. ?82% improved communication skills. ?79% have more empathy and concern for others. ?74% became more responsible and disciplined. ?72% improved goal-setting skills. ?66% became more aware of career opportunities available in the animal industry. ?50% increased understanding of current issues in the animal industry. Similar results were also reported by participants in the dairy programs and the Junior Breeder Livestock Symposium.

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Annie's Project New Jersey and Beyond - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Annie's Project New Jersey and Beyond

There are over 1500 women in New Jersey who identify themselves as "primary operators" of their farms. It is imperative in order for them to succeed that they are well informed on risk management and farm business management.

What has been done

RCE Specialists and Agricultural staff have completed 4 years of Annie's Project. Annie's Project New Jersey which is tailored to New Jersey farmers and differs from Annie's Project in other states in five key areas: 1) the focus on creating a farm business plan throughout the training, 2) the use of social media education and adoption for marketing and business development, 3) the use of social media tools to assist the participants in networking that is sustainable and interactive, long after the course is completed, 4) using a unique combination of in-person education and distance learning opportunities to expand the audience within the program, and 5) recording the distance learning sessions for asynchronous education of participants and additional women farmers following the completion of the "live" course. We also took this concept abroad per Rutgers' mission, Jersey Roots, Global Reach. Last year was the 3rd year of Suzanne's Project in Turkey and the first year of Suzanne's Project in Guyana. We added an International Service Learning component called Empowering Turkish Women Farmers and took 5 students to live on farms in Boztepe Turkey to develop case studies for future Suzanne's Project classes. In addition RCE provided educational forums on the availability of crop insurance products and risk management tools, we have ensured that our clientele are well informed and able to reduce their farm risk. By providing networking opportunities, we ensured that our clientele know where to go for help and are able to develop business contacts as well as friendships and support networks. Educational resources can be found at the following websites: <https://learn.extension.org/events/1689>, <https://learn.extension.org/events/1861>, <http://www.extension.iastate.edu/annie/mtt.html>, <http://aesop.rutgers.edu/~farmmgmt/anniesproject.html>, <http://aesop.rutgers.edu/~farmmgmt/apfwconference2013.html>,

Results

Annie's Project New Jersey has resulted in scholarly deliverables as well as positive changes in the lives of program participants. Classes resulted in a number of participants writing a formal business plan for their farm including a mission statement, marketing analysis, and financial statements.

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Crop insurance Education of NJ Farmers - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Crop insurance Education of NJ Farmers

New Jersey fondly known as the garden state, is home to about 9,100 farms of which produce approximately 32,000 cattle and calves, 8,000 hogs and pigs, and 7,000 cows which produce annually 31 million pounds of milk. Furthermore 90,000 acres are in corn production and 89,000 acres of soybeans are grown annually. Recent weather events such as climate change and hurricanes have increased instances of damaging weather for crops, because of the unreliable weather conditions it is in the growers best interest to cover their risk using crop insurance which would allow them to return to production even after suffering a crop loss, or a crop loss that lead to increase livestock production expenses.

What has been done

RCE Agricultural Agent and Staff delivered training to over 5,677 producers through a wide variety of educational venues including meetings, one-on-one sessions, workshops, conferences/sessions, newsletters, postcards, bulletins, blogs, and radio public service announcements that reached 287,198 producers and individuals in a timely manner. We placed special emphasis on providing services to small farms, socially disadvantaged producers, we also targeted beginning farmers, immigrant farmers, and farmers seeking production changes, and exhibited at a two day Native American PowWow.

Results

In 2014, 1,539 crop insurance policies were sold in the state. These policies covered 172,950 acres of New Jersey's farmland with \$81,808,275 worth of liability. With the recent unpredictable weather, it is imperative to not only maintain but continue to increase the crop insurance policies sold in NJ through the use of crop insurance education and risk management outreach.

4. Associated Knowledge Areas

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

Outcome #14

1. Outcome Measures

Pepper Evaluations for Phenotypic Traits, Physiological Disorders, Diseases and Cultural Practices - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pepper Evaluations for Phenotypic Traits, Physiological Disorders, Diseases and Cultural Practices

New Jersey grows 3,200 acres of bell peppers for a value of \$27,649,000 a year and is ranked third in the nation (NASS, 2014). The principal disease problems with peppers are Phytophthora blight (*Phytophthora capsici*), anthracnose (*Colletotrichum* sp.) and bacterial leaf spot (*Xanthomonas campestris*) (BLS). The number one disease problem in New Jersey is phytophthora blight which is endemic in southern New Jersey.

What has been done

Yearly the pepper advisory committee evaluates the pepper research and extension efforts. They review the results from the past year and make recommendations for the following year. Goals and objectives ?Select cultivars that have tolerance or resistance to phytophthora, blight Bacterial Leaf Spot and Anthracnose with good horticultural characteristics. ?Evaluate cultivars for the presence of skin separation (silvering) ?Determine the races of bacterial leaf spot found in New Jersey bell pepper cultivar evaluation initially commenced to select cultivars with good horticultural characteristics (fruit size, shape, color, etc.), but with the identification of phytophthora blight in southern New Jersey disease tolerance was added. In 2014, 18 cultivars and advanced breeding lines were evaluated for tolerance to Phytophthora and silvering. Advanced breeding lines and commercially available cultivars are screened in a naturally infested field. Materials are evaluated for at least two years than those with a high tolerance to phytophthora are screened for horticultural characteristics and yield. Materials which have both tolerance to disease and good horticultural characteristics are recommended to growers for trial planting on their farms. Six cultivars and breeding lines with resistance to various bacterial leaf spot races were planted in a commercial field to assess which races may be present in South Jersey. These trial results demonstrated that races 1, 2, 3, 4 and 6 can be found on New Jersey farms. The next step is evaluating breeding lines that have tolerance to bacterial leaf spot.

Results

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

4. Associated Knowledge Areas

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

Outcome #15

1. Outcome Measures

Rutgers NJAES Strawberry Variety Release Project - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rutgers NJAES Strawberry Variety Release Project

Strawberries are a high value crop and can be very profitable for eastern United States farmers. Unfortunately the climate and pest problems of strawberries in the region create challenges for local production. Farmers seek strawberry varieties which are better adapted to the region, are pest resistant, and produce high quality fruit with excellent flavor for local markets.

What has been done

Utilizing traditional plant breeding the Rutgers NJAES has developed strawberry selections which have the potential to help farmers enhance local production and marketing. With this potential in mind, a project was initiated to evaluate and expedite the release of new strawberry varieties for eastern U.S. farmers. The new strawberry selections were tested in field research trials at five Universities and on thirteen local farms using both organic and conventional production systems. Rutgers NJAES developed partnerships with two commercial strawberry nurseries to test the plant material for potential release to the industry. Consumer input on the flavor of the new strawberries was obtained through blinded taste panels. Farmers and industry professionals were educated on this research and local strawberry production techniques through twenty six presentations and tours at on-farm meetings and winter meetings and conferences. Consumers learned about the project through field days and the taste panels.

Results

The results of the University field research and on-farms trials resulted in plant patents applications for three of the Rutgers NJAES strawberry selections. One of the selections was released for commercial production and named "Rutgers Scarlet"™. Two nurseries have requested licensing agreements to begin commercial production of "Rutgers Scarlet"™ and have expressed interest in agreements for other selections. One commercial nursery got orders for over 30,000 of the "Rutgers Scarlet"™ strawberry plants.

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 #16

1. Outcome Measures

Weed Control in Vegetables and Fruit - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Weed Control in Vegetables and Fruit

Weeds reduce yield quality and earliness, increasing the cost of food.

What has been done

The target audience are county agricultural agents, farmers and agricultural business persons. The goal is to improve their knowledge on weed control subjects.

Results

Yield and quality of vegetables and fruit has increased.

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 #17

1. Outcome Measures

Resistance Management for Fresh-Market and Processing Vegetable Crops in New Jersey - 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
2014	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 A 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, 25,000+ fungicide resistance management guidelines have been distributed in the mid-Atlantic and surrounding region representing over 100,000 A 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 New Jersey and other states. The resistance management guides have become widely adopted and used by many vegetable growers to help develop effective season-long fungicide spray programs while helping to reduce the chances for fungicide resistance development in the region. Recommendations guides are updated annually and available on-line through the Vegetable Crops On-line Resource Center hosted by the New Jersey Agricultural Experiment Station (<http://plant-pest-dvisory.rutgers.edu/>) and other state experiment station websites.

Results

Demand for the FRAC guide remains high and each year the fungicide resistance management guide is distributed to more vegetable growers in the mid-Atlantic and surrounding region.

4. Associated Knowledge Areas

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

Outcome #18

1. Outcome Measures

Improving Economic and Environmental Sustainability in Tree Fruit Production through Changes in Rootstock Use - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Improving Economic and Environmental Sustainability in Tree Fruit Production through Changes in Rootstock Use

With the competitive international market, the demand for high quality fruit by consumers, the strong pressure to reduce chemical use, and a need to enhance the economic efficiency of production, tree-fruit growers must look to alternative, economically and environmentally sustainable management schemes of production. Growers who want to stay profitable must establish high-density plantings with much smaller trees using new cultivars. These high-density plantings may cost 10 to 20 times more to establish than low-density plantings, thus greatly enhancing the economic risk.

What has been done

Over 10 research trials have been conducted in NJ, 8 at Rutgers Snyder Farm, one at RAREC and one at Rutgers Cream Ride Station. An RCE County Agricultural Agent has conducted extensive multi-state nursery research at the Adams County Nursery (ACN) Delaware location from 2012-2014. At ACN extensive plant growth regulator applied research has been conducted to enhance the apple tree quality for current high density tall spindle systems. In NJ, the main goal has been to evaluate the influence of rootstocks on temperate-zone fruit tree characteristics grown under varying environments using sustainable management systems.

Results

Research has resulted in recommendations and educational programs which guided planting of 170,000 acres of fruit trees over the past 5 years in the U.S. Recommendations have increased yields by 20% per acre in mature orchards, improved fruit size by 10%, increased the percentage of fruit meeting the highest grade category by 20%, shortened the time to pay back an orchard from more than 10 years to less than 8 years, and the financial benefit to U.S. fruit growers was \$200,000,000 over the last 5 years. Pesticide use in high density orchards was reduced nearly 40% with associated environmental benefit plus \$100,000,000 saved over the past 5 years in pesticide cost and application.

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 #19

1. Outcome Measures

Extend and Maximize the Post-Harvest Quality of High Value and Perishable Crops - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Extend and Maximize the Post-Harvest Quality of High Value and Perishable Crops

Small fruit and cut flowers are important horticultural commodities in the US. The annual retail trade in floricultural products is a \$32 billion industry. Cut flowers are a highly perishable commodity and methods to reduce losses due to fungal disease and senescence during shipping is vital. The small fruit industry is likewise a significant horticultural industry in the US. For example, strawberries are a \$2.3 billion industry.

What has been done

An NJAES researcher is developing an organic system to control postharvest fungal diseases of fresh fruit and flowers during shipping and storage, using the controlled release of natural antifungal volatile compounds in a modified atmosphere package. This research will make it possible to reduce production losses of high value, perishable, organic and conventionally grown horticultural commodities. These losses are estimated to be as high as 25% in the US and even greater worldwide. Export markets for US blueberries and strawberries could expand as post-harvest life is extended and microbial contamination reduced. Cut-flower losses will be reduced, increasing profitability of the legal global trade in cut-flowers.

Results

This research has resulted in a patent application for a cost effective solution to the problem of microbe-mediated degradation of packaged agricultural products. This solution harnesses the anti-microbial properties of volatile essential oils of herbs (such as thyme) and controls the release of such anti-microbial oils in a manner that inhibits, prevents, or delays microbe-mediated degradation or decomposition of produce (such as cuts fruits and vegetables) and cut flowers. This technology will benefit growers, processors and shippers of fresh produce and flowers by reducing losses due to disease. The technology will also extend the shelf-life of these commodities and benefit consumers as well. This method will potentially expand the trade in fresh fruit and flowers, increasing incomes to farmers and workers worldwide in a way that reduces microbial contamination of these products.

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 #20

1. Outcome Measures

Metabonomic Detection of Abnormalities in Horses: A search for Early Diagnoses and Dietary Intervention and Potential Models for Human Disorders - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

Equine animals (*Equus caballus*) are the #1 agricultural animal industry in New Jersey and generates over \$1.1 billion in revenue annually. In addition to sport and recreational activities, horses are used in mounted police activity, search and rescue, therapeutic riding and "youth at risk" programs. It has been well documented that there are genetic predispositions to common diseases such as osteochondrosis dissecans (OCD), recurrent rhabdomyolysis, and laminitis that can severely limit a horse's usefulness.

What has been done

NJAES researchers have conducted a series of experiments, gathering and analyzing data to identify the metabolic defect and associated nutrient needs associated with a genetic predisposition to osteochondrosis (OCD) that will allow early detection of horses predisposed to the development of lesions and to develop nutritional intervention to reduce or eliminate development of lesions in predisposed horses.

Results

In 2014, these researchers reported that the metabolic profile associated with OCD in Standardbreds was refined to the point that the potential metabolic defects associated with the increased risk of development of lesions were identified. Genomic data supported the metabolic profile. Based on that profile, a nutritional formula was developed that theoretically would reduce the incidence of lesions in predisposed animals, for which a patent is now pending. A spectral analysis of the Thoroughbred data revealed similar but distinct metabolic differences between OCD and non-OCD yearlings. Negotiations are in progress to scientifically test the formula in predisposed horses.

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 #21

1. Outcome Measures

Genetic Improvement of Woody Plants (Trees and Shrubs) for Ornamental Uses - 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
2014	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 ornamental and potential cropping purposes that are adapted to the specific climatic and edaphic conditions of the US.

What has been done

NJAES researchers are breeding improved, disease- and pest-resistant woody ornamental plant cultivars of dogwood, hazelnut, holly, and other species that are both attractive and hardy. Hazelnut, in particular, has potential agricultural applications within the eastern United States if varieties that are resistant to eastern filbert blight disease can be developed.

Results

NJAES researchers report that a project to fingerprint the NJAES collection of Cornus (dogwood) germplasm with SSR markers is nearing completion, which will help determine genetic relationships between these plants and those available in the trade, and for added intellectual property rights protection. Progress is also reported on optimizing the use of tissue culture techniques as a means to efficiently and effectively propagate new hybrid dogwoods. A patent application was filed in 2014 for a new dogwood variety.

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 #22

1. Outcome Measures

Fungicides and Vegetables - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Fungicides and Vegetables

Vegetable crops must be grown economically and efficiently in order for small-scale vegetable growers to compete in the larger US and international marketplace. Growers rely on integrated pest or best management practices which incorporate different production and cultural practices to help control insects, weeds and plant disease. Without proper disease management strategies, annual losses to vegetable disease would exceed millions of dollars annually. One of the most destructive soil-borne diseases of solanaceous and cucurbit crops is *Phytophthora capsici*. In the US, losses to phytophthora blight exceed millions of dollars annually.

What has been done

NJAES Extension Specialist evaluates how resistant various vegetable cultivars are to phytophthora blight and other fungal diseases, monitors fungicide resistance development among vegetable cultivars, and develops fungicide resistance management strategies. Fungicide resistance management guidelines have been developed for all 30 crop groups listed in the commercial vegetable production recommendations guide for the five Mid-Atlantic States (NJ, PA, VA, MD, and DE) and WV to help vegetable growers manage fungicide resistance development on their farms.

Results

Fungicide resistance management guidelines have been delivered to thousands of vegetable growers, crop consultants, crop advisors, extension specialists and county agents at local, state, and regional meetings in our region for the past 8 years. This guide has brought the awareness and importance of understanding FRAC codes/fungicide resistance management to thousands of vegetable farmers in and outside the mid-Atlantic region. The guide has allowed for important decisions to be made in controlling important vegetable diseases and reducing the chances for fungicide resistance development. The use of this guide will help prolong the efficacy of important fungicides/fungicide classes with known risks for resistance development in our region. This is extremely important in pathogens where there are only a few effective, high-risk fungicides labeled for control.

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 #23

1. Outcome Measures

Antioxidant Supplements, Oxidative Stress and Muscle Oxidation in the Young Racehorse - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Antioxidant Supplements, Oxidative Stress and Muscle Oxidation in the Young Racehorse

Losses of top equine athletes at Olympic Games, World Equestrian Games and Thoroughbred Triple Crown Races, have provoked public interest in the performance and welfare of competitive horses.

What has been done

NJAES researchers specifically examined the effect of acute exercise and intensive exercise training on the oxidative stress, antioxidant status, and muscle metabolism of yearlings and mature mares.

Results

Research findings indicate that training did significantly improve antioxidant status and reduce oxidative stress in the mature trained mares, while the trained yearlings did not exhibit significant changes in either regard. When challenged to acute exercise before training, it was found that the mares had significantly higher levels of oxidative stress and stress hormone (cortisol), as well as lower antioxidant status, compared the yearlings. After exercise training, when undergoing acute exercise, the trained mature mares had lower levels of oxidative stress compared to prior training and, when challenged with acute exercise, had lower oxidative stress and cortisol. With the yearlings, there were fewer significant changes in oxidative stress after training and in response to acute exercise. In conclusion, young, maturing horses had lower levels of oxidative stress and cortisol, and higher levels of antioxidants, compared to mature mares. Training can help reduce levels of oxidative stress in mature mares while, in young horses, training is not as influential in reducing oxidative stress, suggesting that their young age is the most important defense against exercise-induced oxidative stress. An important aspect of this study was that no antioxidant supplementation was used. Antioxidants have become wildly popular as supplements, for both human and equine athletes.

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 #24

1. Outcome Measures

Weed Control in Cranberries - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Weed Control in Cranberries

Weeds, particularly perennials, are difficult to control in cranberry bogs. Cranberry growers in New Jersey, Massachusetts, Wisconsin and elsewhere need effective herbicide treatments for weed control.

What has been done

Field studies were conducted to evaluate efficacy and potential phytotoxicity of new herbicides for use on newly planted and established bearing cranberries. Herbicides, including indaziflam and two formulations of diclofenil, were evaluated for crop safety and efficacy for the control of redroot in cranberries. Indaziflam injured cranberries in past studies when applied during active growth, but the herbicide did not injure cranberries when applied in early spring soon after the winter flood was removed. Research conducted in prior years confirmed that indaziflam could be applied to cranberries safely in early spring. Weed research at Rutgers Blueberry and Cranberry Research Center, Chatsworth, New Jersey, evaluated a new experimental herbicide, BCS-AA10717, from Bayer. The new Bayer herbicide did not injure cranberries when applied in early spring before any new growth was evident, but slight injury was observed when cranberries were treated after buds began to swell in May. Previous work indicated that cranberries were injured when treatment was delayed until after the growing season had begun. This herbicide has provided excellent weed control in tree fruit studies, and is similar to Casoron in chemical structure.

Results

New herbicides, including mesotrione (Callisto 4SC) and quinclorac (Quinstar 4L) were registered for use in cranberries, and extension agents and commercial growers were instructed on the safe and effective use of these products. One grower reported that cranberry yields rose from 50 to 80 barrels per acre to over 150 barrels per acre as a result of improved weed control. Special effort was made to improve the control of weeds in newly planted cranberry bogs, where weeds slowed the establishment of the crop. A large grower reported that the time between planting a new bog and the first commercial harvest was reduced from 4 to 5 years to less than 2 years due to improved weed control. This improvement in the time line for bringing new bogs into production has been due to growers adopting the use of mesotrione and quinclorac in new non-bearing

cranberry bogs.

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 #25

1. Outcome Measures

Molecular Mechanisms Regulating Skeletal Muscle Growth and Differentiation - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Molecular Mechanisms Regulating Skeletal Muscle Growth and Differentiation

The identification of an optimal protein intake level (not the minimal requirement) for health and wellness has yet to be established for animals and humans. Much controversy exists concerning optimal protein nutrition for metabolic health and longevity. Results can be used to refine current diet formulations to maximize muscle mass in domestic animals and thus benefit the meat industry.

What has been done

Rodent models (control wild type or genetically modified) were fed diets containing different levels of essential amino acids in combination with different levels of dietary fat and/or physical activity. Body composition and fuel usage was monitored in live animals and signaling pathways regulating protein synthesis were assessed at the levels of mRNA and protein expression, using standard biochemical and molecular biology approaches in collected tissues.

Results

During 2014, NJAES researchers conducted more analysis to confirm preliminary results reported in 2013 regarding mTORC1 signaling pathway? a protein complex that controls protein synthesis and is a dominant growth mechanism in muscle. We can now say conclusively that the mTORC1 signaling pathway is not activated by the plant steroid 20 hydroxyecdysterone (20HE). 20HE is found in high abundance in quinoa and spinach and is present in other plant products and has been associated with metabolic or anabolic benefits. However, results indicate that the 20HE plant steroid is unlikely to be a potent anabolic agent in animal feed, as oral consumption of this plant steroid does not acutely activate signaling pathways that promote skeletal muscle protein synthesis. These results contradict previously published claims of muscle growth by 20HE; however, these prior reports utilized cell culture models or infusions in mice. Our results make an important contribution to understanding if and how plant steroid compounds like 20HE can be used in animal feed to promote leanness, indicating that the use of these compounds in animal feed are not expected to augment any anabolic effects of protein intake.

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 #26

1. Outcome Measures

Conservation and Utilization of Plant Genetic Resources - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Conservation and Utilization of Plant Genetic Resources

The consistent development of a steady stream of new and improved tree fruit varieties is critically important to our long-term agricultural competitiveness. The identification of new sources of genetic diversity to develop peach, apricot, and apple cultivars which are better adapted to ever-changing northeastern growing conditions is essential to the survival of the tree-fruit industry.

What has been done

NJAES researchers are using classical plant breeding methods to develop novel tree-fruit germplasm that integrates diverse useful genes from various resources to breed, release, maintain, and evaluate improved germplasm and cultivars. They have continued to acquire and characterize *Prunus* and *Malus* plant genetic resources for its potential use in plant breeding programs in the Northeast and elsewhere in the US, and other similar temperate environments in Europe, North Africa, South America, Australia and New Zealand.

NJAES researchers propagated trees to be used in crosses in the greenhouse and harvested open pollinated seeds to select segregants that are better adapted to our local environment with superior cultivars and advanced selections. The major objective of the apricot (*Prunus armeniaca* L.) breeding program is to develop apricots with improved eating quality and broader range of adaption. The focus of our peach and nectarine [*Prunus persica* (L.) Batsch] crosses this year was to develop mid-late ripening cultivars with large, firm fruit that soften slowly, and are tolerant to bacterial spot (*Xanthomonas campestris* pv. *pruni*).

Results

A patent application was filed for one apricot selection that is being propagated for release to fruit growers. This variety produces an attractive fruit with 30% red blush over a dark orange ground color. The fruit are sweet and juicy, have a nice aromatic flavor, and ripen early.

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 #27

1. Outcome Measures

Turfgrass Breeding - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Turfgrass Breeding

Turfgrass touches millions of Americans' lives daily in physical and social ways that make it an important and positive element in a myriad of environments. Disease and pest-resistant grasses will reduce the use of fungicides and insecticides needed to maintain fine turf areas. Improved cultivars with better wear tolerance can provide better, safer sports turf. There is a great need for cultivars with better shade and drought tolerance and a reduced growth rate to also reduce maintenance costs. The development of improved breeding and evaluation techniques will benefit other breeding programs designed to improve turf, forage, and biomass grasses.

What has been done

Researchers from the NJAES Center for Turfgrass Studies gather and analyze turfgrass samples from around the United States, as well as from Europe, Africa, and Asia, to identify and evaluate grass germplasm with desirable traits that can be incorporated into our turfgrass breeding program. Over the past few years, new emphasis was placed on the genetic control of different growth habits in tall fescue and breeding for drought tolerance in tall fescue. Continued emphasis on breeding for disease resistance for rust in Kentucky bluegrass, dollar spot and red thread in fine fescue and red thread dollar spot, gray leaf spot and summer leaf spot in perennial ryegrass. A new emphasis placed on developing turfgrass for low maintenance conditions with limited fertilizer, pesticides and water inputs. Center for Turfgrass Studies staff also maintain and monitor cultivars developed at the New Jersey Agriculture Experiment Station to continue the assurance

of quality seed.

Results

Some of the newly released perennial ryegrasses with grayleaf spot resistance released in 2014 were Reenvair, Vision and Manhattan 6 perennial ryegrasses. New promising Kentucky bluegrasses hybrids that were released in 2014 were Waterworks, Zinger and Dautless. Continued developments of turf-type tall fescue were being released in 2014 with improved brown patch resistance. Six new ones were Rambler II, Slate, Leonardo, Rockwell, Michelangelo and Reflection tall fescue. In 2014 the new creeping bentgrass released was Cobra II. Over 40 new cultivar and germplasm agreements were executed in 2014 with turfgrass seed organizations. Eighteen new varieties were increased and named in 2014. During 2014, there were 16 U.S. Plant Variety Protection (PVP) Applications made and 17 U.S. PVP certificates were issued. This will directly benefit golf course superintendents, sod farmers, and turfgrass seed companies. The environment and public at large will also benefit from a reduction in chemicals used to maintain quality turf.

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 #28

1. Outcome Measures

Improving Sustainability, Efficiency, and Efficacy of Peach Disease Management Strategies: Biofungicides, Conventional Fungicides, and Abiotic Environmental Factors - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

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

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

What has been done

An NJAES Extension Specialist examined the new biorational material BLAD, a polypeptide of beta-conglutin derived from sweet lupine seeds, and a combination of copper octanoate (a fatty acid copper material approved for organic use) plus the biological control agent *Bacillus amyloliquefaciens*. These biorational products, currently produced by commercial companies, were tested alone and in alternation with current conventional fungicides.

Results

Findings related to use of biofungicides and improvements in application timing with the bioassay will allow current commercial peach growers to improve the efficiency and efficacy of their disease management programs. This outcome in turn will reduce costs and improve profitability. Furthermore, by substituting and incorporating biorational materials into their programs, conventional pesticide residues in the environment and on harvested fruit will be reduced, thereby benefiting the consuming public. Usage of biorational materials in the field will also reduce applicator exposure to conventional pesticides. Finally, proper deployment of conventional fungicide chemistries, as with the bioassay, will aid in limiting development of fungicide resistant strains of the various peach pathogens.

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 #29

1. Outcome Measures

Nuances of Marketing Ethnic Specialty Vegetables and Herbs - 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
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nuances of Marketing Ethnic Specialty Vegetables and Herbs

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, Hispanic and African 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

Objectives: ? To characterize the size, growth patterns, and produce preferences of major ethnic populations of the East Coast. ? To determine production characteristics and economic potential of selected ethnic vegetables. ? To facilitate coordinated production of selected ethnic vegetables by growers in several East Coast states to create a year-round supply of consistent quality and quantity. ? To identify and evaluate production systems for specific ethnic crops that have potential marketability in the Mid-Atlantic region. Program Design & Content ? Grant funded studies of Ethnic communities and consumers, purchasing habits and food selections ? Identification of potential crops that can be grown successfully and profitably in Mid-Atlantic and East Coast regions ? Evaluation of specific crops and production systems suitable for local farms Program Delivery & Educational Materials ? Field demonstration-research trials ? NJAES and Journal publications ? Ethnic Crop summaries presented at farmer twilight meetings and regional

conferences (NJ, PA, NY) ? Updated and increased resources available on www.worldcrops.org website.

Results

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.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Weather presented a major challenge to researchers this year.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

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

basic and applied research and demonstration were collected and analyzed and reported utilizing a variety of data collection methods appropriate to each research question. The major goal of evaluating is the demonstration of social, economic, behavior and environmental changes in conditions that contribute to improved quality of life as a result of participation in programs and benefits of research solutions. See state defined outcomes for detailed results of each initiative.

Key Items of Evaluation

None to report.